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LOS ANGELES' HYDRO-ELECTRIC POWER PLANT

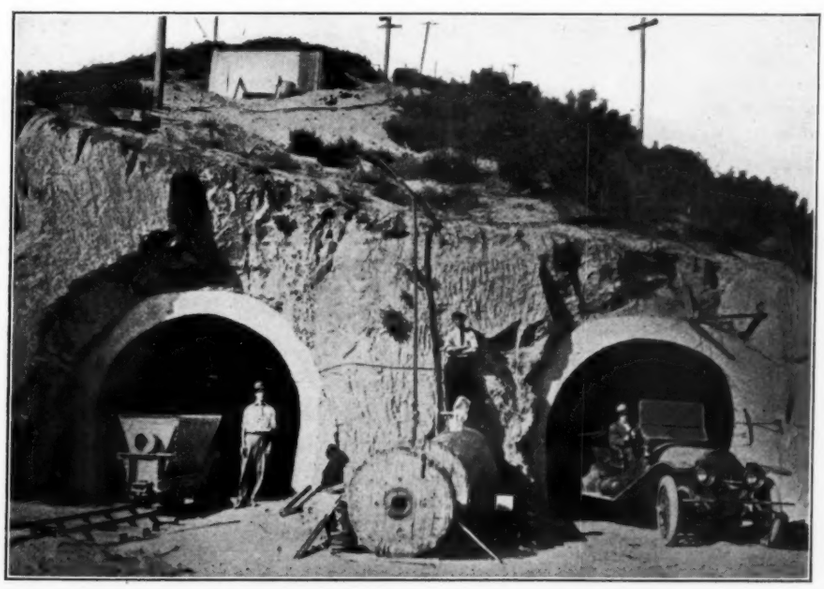
First Installation of Municipal Plants for Utilizing Fall in Aqueduct—Total of Two Hundred Thousand Horse Power Available, of Which 37,500 Horse Power Can Be Develop ed by the Plant Just Completed.

On January 1st, 1917, the city of Los Angeles commenced to distribute energy from a power plant which is said to be the largest municipal hydro-electric power plant in America.

In planning the Los Angeles aqueduct, it was found that opportunities for the development of large quantities of hydro-electric power existed at four points along the aqueduct where the drop in the hydraulic gradient of the pipe line would be considerable. The difference in elevation between the distributing reservoirs for the city and the intake of the diversion conduit 238 miles away is about 2,800 feet, only a part of which was necessary for overcoming friction in the conduit line, and there was left available for power development a total gross head of 1,960 feet. The runoff from the catchment area, together with the regulation provided by several storage reservoirs, assured a constant flow of water of between 400 and 430 cubic feet per second. There was thus presented to the city an opportunity for developing hydro-electric power amounting to approximately 200,000 h. p delivered at the city during periods of peak demand of each day at an average load factor of 55%; that is, an average throughout the day equal to 55% of the peak demand.

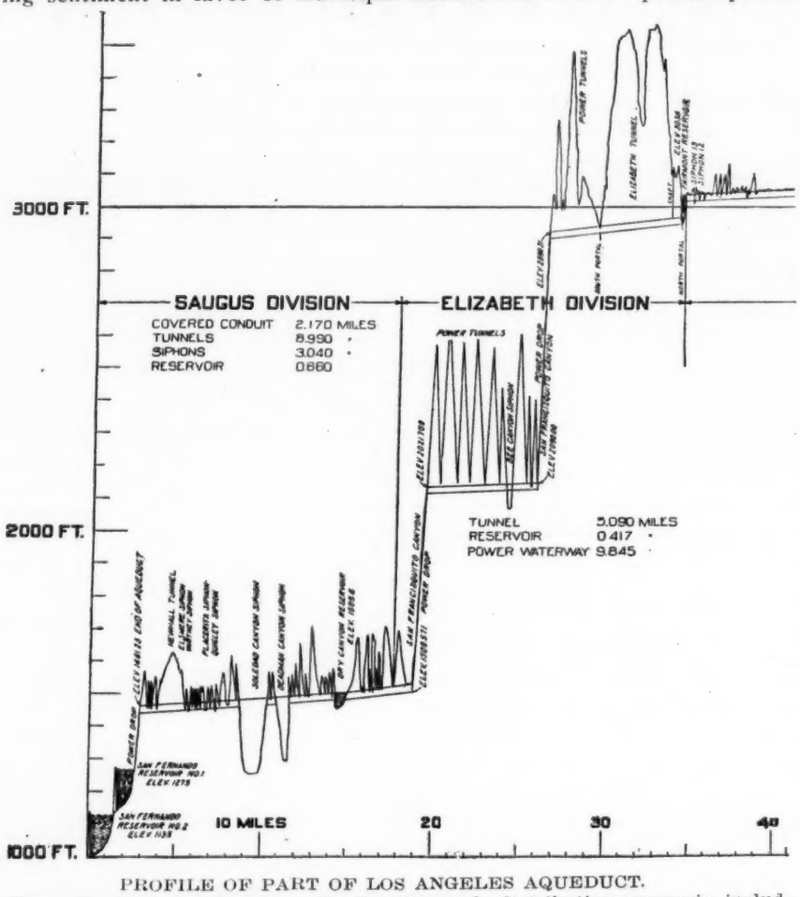
The points specially suited for the development of power were one just below the Haiwee reservoir, 162 miles from the city, where there was a drop of 190 feet; at San Francisquito Canyon, 47 miles from the city, where there was a 940-foot drop; another drop of 530 feet in the same canyon 40 miles from the city; and the fourth between the end of the aqueduct and the lower distributing reservoir of about 300 feet. In addition to these, the city will have available, when needed, further power opportunities on Cottonwood creek and other creeks tributary to the Owens river, about 200 miles from the city.

In order that the plans for the aqueduct might be conditioned to meet the requirements of power generation also, and that the heavy construction work required by the power developments might be begun as soon as possible and the city thus realize the benefits from the power opportunities at the earliest practicable date, the Bureau of Los Angeles Aqueduct Power was created in September, 1909, with William Mulholland, the chief engineer of the aqueduct, as supervising engineer, and E. F. Scattergood, the electrical engineer of the aqueduct, as chief electrical engineer. The issuance of $3,500,000 in power bonds was authorized in April, 1910, but owing to court proceedings, the funds did not become available until April, 1912.



SOUTH PORTALS OF PENSTOCK TUNNELS OF UPPER SAN FRANCISQUITO PLANT.

The public by vote had twice expressed its overwhelming sentiment in favor of municipal distribution of the city's power, and proceedings were initiated in 1911 for providing the funds necessary for this. After long delays due to negotiations with local power companies and determined opposition of power interests to the establishment of a municipal system, an additional $6,500,000 was authorized in May, 1914, for the completion of the first installment of power development and for distributing the same to the city and its inhabitants, by purchasing existing electrical distributing system if possible, otherwise by the installation of a new distributing system; the definite understanding being that $5,250,000 of the power bonds authorized was to be used for providing a municipal distributing system. The local power companies positively refused to sell their distributing system to the city after many months of negotiations, but the City Council and Board of Public Service Commissioners instituted proceedings before the State Railroad Commission in November, 1914, for the fixing, by the commission, of the just compensation which should be paid the Southern California Edison Company by the city for its electric distributing system within the city, by condemnation. In December, 1916, the city and the Pacific Light and Power Company and the Southern California Edison Company came to an agreement on the basis of $8,270,000 for the physical property and $1,145,000 for severance damages; these sums being based on the findings of the State Railroad Commission. The city also agreed to purchase from the two concerns such power as it needs while its generating system is being built up, the price being cost plus severance damages. The two companies decided to retire from business within the city and to combine in carrying on their power operations and sale without the city.



PROFILE OF PART OF LOS ANGELES AQUEDUCT.
Shows the first 40 miles above the San Fernando distributing reservoir, including the upper and lower power drops in the San Francisquito Canyon. The present plant is at the foot of the upper drop.

The municipal power plant will supply power to small users at a reduction of from 10 per cent to 20 per cent below the price charged by the local power companies. Large users, such as factories, stores, etc., will be able to obtain power from 30 per cent to 40 per cent below the rate they are now paying.

It was decided in 1911 that the first installment of power-generating works would consist of a line of rock tunnels leading from the south portal of Elizabeth tunnel to the upper power site in San Francisquito Canyon, approximately 2½ miles long, this line of rock tunnels including two short siphons between the upper and the lower drops in this canyon, and leading from the lower one to the point where the aqueduct tunnels connect with this canyon, a total distance of approximately seven miles; a surge chamber between the end of the line of tunnels leading to the upper power plant and the steel pressure pipes leading to the upper power house; together with pressure pipes and power house machinery necessary for developing 37,500 h. p. at that point. Also transmission lines and switching stations for a 100,000-volt current and a central receiving station within the city. The estimated cost of these works was $4,750,000; and the additional cost of completing the plant for developing the 69,000 h. p. at the upper site and installing the power plant at the lower site, thus increasing the total amount at the

SAN FRANCISQUITO POWER HOUSE NO. 1.
Penstock line behind power house; surge chamber just visible at top of hill.

SURGE CHAMBER AT TOP OF PENSTOCK LINE.

two plants to 113,000 h. p. (or approximately 105,000 h. p. at the receiving substation in the city) is approximately $2,000,000; thus making the total investment cost delivered at the central substation less than $65 per h. p. for this portion of the city's proposed hydro-electric power. The distance to the city is about 45 miles, and two separate steel tower transmission lines will be used, each supporting two electric circuits; thus insuring that there will be no interruption in the transmission of power. On account of the comparatively short distance between the power plant and the city, comparatively little of the power will be lost in transmission.

The power plant which has been placed in operation, is at the upper of the two drops in the San Francisquito Canyon, these two being about seven miles apart. The drop here is 940 feet, and the total h. p. which can be developed is estimated at 69,000. At present, however, the plant has a capacity of only 37,500 h. p., which can be increased to 69,000 by the addition of three units. The lower of the two San Franciscquito Canyon power drops will permit a development of 44,000 h. p.

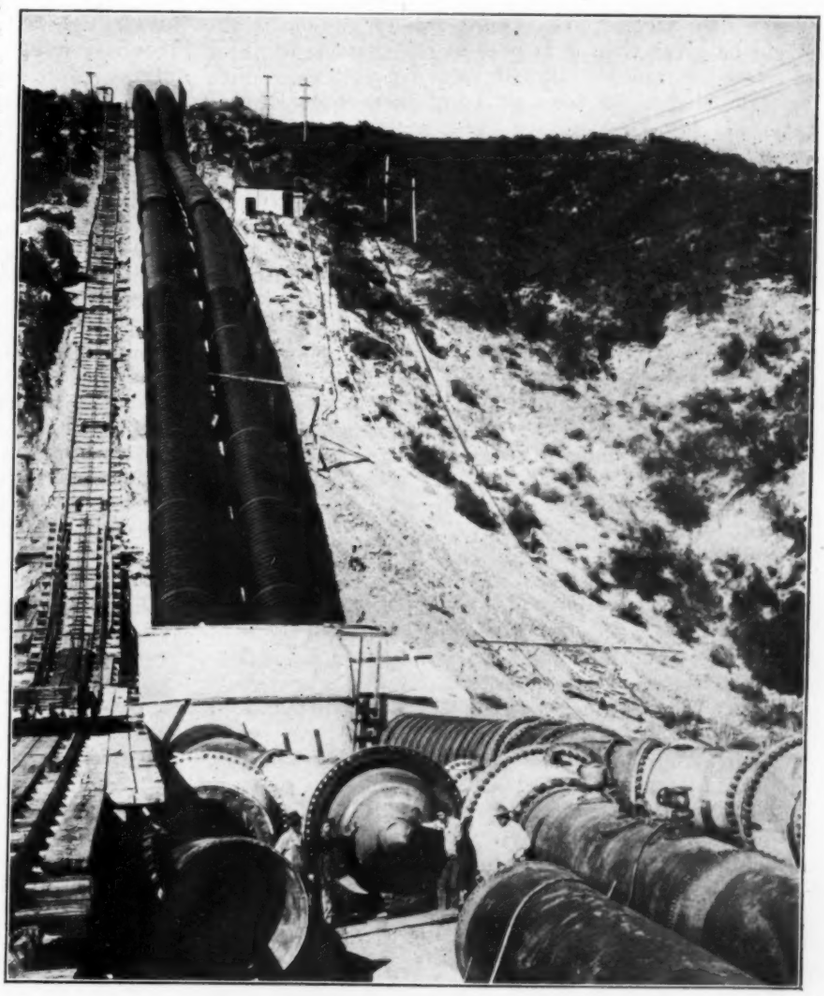
A storage and regulating reservoir known as the Fairmont reservoir is provided about 8 miles above the two power drops in the San Francisquito Canyon, and another regulating reservoir a short distance below the lower drop known as the Dry Canyon reservoir. The upper reservoir will permit temporary excessive drafts for peak loads in the power plant; while the lower reservoir will regulate the draft to suit the demand for water consumption in the city. Other reservoirs along the line will perform similar service for the power developments at other points. The Fairmont reservoir can receive 420 cubic feet per second through the conduit leading into it from above; but the outlet tunnel from this reservoir to the power plant has a capacity of 1,000 cubic feet per second, thus permitting a peak load equivalent to more than twice the average power which can be furnished by the conduit. The capacity of this reservoir is 7,620 acre-feet. The dam has a maximum center height of 115 feet. It is built of earth with a concrete corewall and contains 607,114 cubic yards of earth.

FREEZING MAINS IN BILLINGS.

Montana had extremely cold weather during January, February and March, 1916, and certain results in Billings are described in the annual report of the Water Board for 1916 as follows:

"We had about 14,000 feet of water mains frozen and about 50 per cent of the services were frozen sometime during the cold weather. The Water Department was called upon day and night for more than six weeks to give assistance and relief from the many broken service pipes that flooded the streets and made some of them almost impassable.

"The department did all it could to relieve the situation, furnishing teams for weeks to haul water to a large number of people who could not be supplied on account of the mains being frozen, and until such time as the mains could be thawed or new mains laid, which had to be done on a number of streets. It was the middle of April before all mains were thawed and relaid and the system in normal condition, at a cost to the department of $11,000. All water mains that were relaid were placed 5½ feet deep. Several blocks where the mains were frozen were lowered during the past summer months to prevent them from being frozen again. We will be better prepared to meet a like condition should it ever occur. We are endeavoring to have all water mains and service pipes placed deep enough to prevent freezing."



LOWER PART OF PENSTOCK LINE.
Showing German banded pipe, and needle valves in 57-in. Y branches where two lines branch into four.

TRAFFIC CENSUS

Of Service in Selecting Pavement, Studying Street Widening and Street Planning, and Regulating Traffic, Both Roadway and Sidewalk.

In a paper before the annual congress of the American Road Builders' Association, D. B. Goodsell, assistant engineer in the Department of Public Works, Borough of Manhattan, New York City, discussed the subject of the application of traffic census to the designing of roadways, selection of types of pavement and traffic regulation. He considers that a traffic census can be applied to advantage in many directions in city work, not only in the selection of pavements, but in studying the matter of street widening and removal of encroachments, regulation of traffic, fixing values of property, opening new streets or extending old ones, operation of street railroads and of busses under franchise, regulation of the dimensions, weights, etc., of vehicles, and a determination of the amount of wear of different kinds of pavement under known weights and amounts of travel.

It is not practicable to decide what main roadways should be improved solely by studying the existing traffic on those and other roadways, for there are too many other controlling conditions which may cause the traffic at present to avoid a route which would be the most convenient and economical one were it better paved. Nevertheless, a traffic census has a place in the designing of country roads, but a still more important one in connection with city streets. On a suburban or country road which accommodates auto traffic, greater width should be given than is at present the practice to allow for more clearance of rapidly moving vehicles. With traffic moving at 25 miles an hour, there should be at least four feet clearance to avoid accidents and unexpected deflections of an overtaken car from its course; consequently, twenty feet of paved roadway is desirable for two lines of travel and thirty feet for three lines.

By 1911 it was realized that a number of narrow cross-town roadways in the mercantile district of the Borough of Manhattan, New York, and some of the north and south avenues as well, required widening or clearing of obstructions, and nearly seven miles on fourteen streets and avenues have been so cleared. On each of these streets a ten-hour census was taken of the vehicular and pedestrian traffic and this resulted in bringing to light places of unexpected congestion and afforded clues as to how the traffic could be diverted. It was found that, where the maximum number of vehicles per foot of width per minute exceeded one-half, there was much serious congestion; likewise, where the maximum number of pedestrians per foot of width per minute exceeded five, they overflowed into the roadway. Where both these conditions obtained, a widening of the entire street was necessary; where the former, a widening of the roadway at the expense of the sidewalk might be practicable. The effective widening of the total traffic space in the street has been obtained over the length mentioned above, by clearing the sidewalks of stoops, railings, courtyards, areaways and other projections, and then widening the roadway to accommodate the number of lines of travel decided upon. The traffic census provided the strongest kind of supporting data for promoting legislation that would permit this work, by showing indisputably the need or otherwise of street widening.

In selecting kind of pavement, the effect of the relative amount of horse-drawn and motor traffic should be given weight. In cities with intensive traffic where more than 75 per cent is motor traffic, sheet asphalt is the pavement par excellence, in the opinion of the writer. If the traffic is evenly divided into rubber and iron tires, wood block stands out preeminently; while if slow moving horse-drawn traffic amounts to more than 50 per cent of the whole, close jointed granite blocks are eminently satisfactory. These limitations are to be applied, of course, where traffic conditions are considered as the controlling factors in forming a decision.

The difference in traction between these three kinds of pavement is indicated by tests shown in a pamphlet on "Tractive Resistances of a Motor Truck," by A. E. Kennelly and O. R. Schurig, giving the averages of tractive resistances at a speed of 19 miles per hour, as follows:

Pavement	Tractive Resistances in lbs. per ton
Asphalt	19
Wood and brick	23
Granite	26
Macadam	22.5
Tar macadam	24.5
Gravel and cinder	26.5

Tractive resistances should, in the opinion of the writer, be given much greater weight in the selection of pavements in cities than is usually accorded them, for it will hardly be questioned that auto trucks will soon be in almost universal use in cities and by that time the economy of fuel will undoubtedly have been carefully examined into, and smooth, light-traction surfaces demanded for economy of operation. To-day scant attention is paid to grade or consumption of gasoline, and a scenic highway is at times preferred to a shorter route requiring less energy; but there is going to be an urgent demand for such economical routes by auto trucks, especially in the rural districts. It should be considered also that the weights and speeds of motor trucks are both increasing. The preparedness movement has served to draw attention to the fact that it is desirable to consult the War Department as to the loads to which roads and bridges are likely to be subjected for military purposes. The increase in the destructive effect of such traffic points to the need of much harder and more durable surfaces than have been afforded by the penetration method of construction and other kinds of light-traffic bituminous surfaces. Study of traffic census records on numerous roads of various classes are necessary in order to determine the number and weight of commercial vehicles which may traverse economically certain types of road.

Concerning the regulation of traffic, a determination of the amount of traffic in each street of any section of a city should indicate where a diversion of flow is desirable. So far as the writer has been able to ascertain but one study of the flow of traffic has been made, that being in the city of Bridgeport, Conn., by Alfred S. Miller. The writer believes that such studies are highly important where there is intensive traffic on a gridiron system of streets, to the end that alternate traffic routes may be laid out by widening, paving, regrading or otherwise improving certain streets so that congestion may be avoided. In the Borough of Manhattan, the Fifth Avenue Association makes traffic censuses and studies traffic conditions on that avenue, quite independently of the city, as a result of which it is in a condition to make valuable recommendations as to traffic policies which will work to the advantage of traffic on that street. It was suggested to the Police Department, for instance, that the north and south traffic should be given three times as much time at street intersections as the east and west traffic, since it amounted to fully three times as much. Also it is proposed to divert the through traffic

now using Fifth avenue to a parallel avenue, thus affording some relief to the congestion and facilitating movement of the local traffic.

Not only the roadway traffic, but pedestrian traffic as well, needs regulating in business districts. It was found that the average time required by a woman to cross Fifth avenue, the roadway of which has a width of 55 feet, was 11½ seconds. In busy hours six vehicles would pass in that time, requiring the dodging of this number as the crossing is made when traffic is not held up. Pedestrians should certainly be regulated as to time of crossing, if the number of accidents is to be reduced.

A traffic census should include observations as to the direction of flow of traffic, including left-hand turns, number of vehicles emerging from or entering side streets; routes of mail trucks and other vehicles; wandering cabs; as well as a knowledge of the various classes of vehicles. The points at which the count is taken should be studied carefully and this study is best made by plotting bands of different colors and widths along the roadways where the census has been taken. Work of this kind has an intimate relation to building district restriction plans, and to the city plan generally. Uniformity in methods of taking and recording traffic census and in the assignment of weights is much needed. Some office work can be saved by the use of standardized forms, and the writer suggests that this matter be given attention by the Committee of Standards of the society, cooperating, if possible, with other engineering societies.

PAVEMENT OPENINGS

Present Practice and Regulations in a Number of Cities—Conclusions As to Administrative and Construction Methods Desirable.

In a paper read before a meeting of the Citizens Street Traffic Committee of Greater New York, Arthur H. Blanchard gave in outline the present practice and regulations pertaining to pavement openings in a number of cities in the United States. A number of cities were referred to by Mr. Blanchard as illustrations of the methods described. In Cincinnati, for instance, it is unlawful for any person, firm, corporation or city department other than the Street and Sewer Repair Department of the Department of Public Service, to make openings unless a permit is obtained. Philadelphia, with its perfected organization of experienced engineers and inspectors under the Permit Division of the Bureau of Highways, has an efficient, workable plan of control which is worthy of investigation and duplication.

In many cities it has become the practice to post notices on the highways to be paved or repaved and to forward such notices to all property owners residing on streets to be improved, and to persons, corporations and city departments that control sub-surface structures on such streets. As an example of such notices, that issued by the city of Baltimore is as follows:

> You are hereby notified that the street bounding this property is to be paved with improved pavement and that the work will commence shortly after six weeks subsequent to the date of this notice. All necessary underground construction for installing or repairing gas, water, electric and other sub-surface structures must be done before the street is paved. No permits to cut trenches or to disturb the pavement will be issued. Notice to the above effect has been given by public advertising.

The ordinance of the city of Cincinnati states that no permits will be granted within a period of three years after the construction of pavements, except on account of emergencies.

Practically all municipalities of over 50,000 inhabitants require some form of permit for opening a pavement, but in many cases this is a mere formality and one city of 250,000 inhabitants requires only a payment of $2.00 and notice in writing to the commissioner of public works that an opening is to be made. A number of cities have regular schedules of payment; Schenectady, N. Y., for example, charging for asphalt, brick, or granite block, $10 for the first square yard and $3.00 for each yard thereafter, and for macadam $3.00 for the first yard and $1.00 for each yard thereafter. In Seattle, all backfilling and replacing of pavement are done by the superintendent of streets, and the company making the opening is charged the cost of the work plus 10 per cent for overhead charges; the company having been required to make a deposit sufficient to cover the cost.

Inefficient backfilling is the cause of a large percentage of troubles arising from pavement openings. The best plan is to have this work done by experienced employees of the city itself. Houston, Texas, requires that trenches under pavements shall be refilled with well-rammed gravel, broken stone or brick bats, or refilled with tamped earth and covered with reinforced concrete slab mixed 1:2:4, which slab must project 12 inches on each side of the trench, and have a depth of 10½ inches for a 2-foot opening, increasing to 15 inches for a 6-foot opening. Ottawa requires that the regular concrete foundation be supplemented by a reinforced cement concrete sub-foundation 4 inches thick and extending back 4 inches on each side of the trench. Several municipalities require that in replacing the concrete foundation, the old foundation be cut back 6 inches on all sides of the opening, the new concrete thus forming a bridge over the trench.

Based on observations of practice in many municipalities throughout America and Europe, the following conclusions are submitted by Mr. Blanchard as applicable to conditions found in municipalities throughout the United States:

Administration and Organization.—Pavement openings should be absolutely under the control of the Chief of the Bureau of Highways; all persons, corporations, and other city departments being required to secure permits from the Highway Department prior to making openings in pavements, except where emergency conditions require such openings to be made in the interests of public health and welfare.

Notices should be advertised, posted, and sent to all interested parties, giving ample warning in cases where streets are to be paved or repaved and containing the provision that charges to the permittee will cover cost of backfilling, but not artificial foundations and pavements. The practice of not allowing pavement openings to be made within a certain period after a pavement is laid is believed not to be in the interest of public progress and is unnecessary if the notice advocated is given and efficient methods of control, backfilling and repaving are adopted.

Plans of subsurface structures on all streets should be compiled and permits should be granted only after accurate and detailed information has been filed pertaining to all details of substructures in connection with the given pavement opening.

Deposits should be required covering cost of backfilling, reconstructing artificial foundations and repaving, which should be based on a schedule of rates dependent upon the character of backfilling, type of artificial foundation, kind of pavement and yardage of the several items. An adequate percentage should be added to the cost of the above items to cover supervision and other overhead charges.

After a permit has been granted excavation should be made by the permittee, and backfilling and repaving done under the supervision of engineers of the highway department and by a flying squadron of experienced men in the employ of the department.

Backfilling and Artificial Foundations.—All material excavated, except rock, should be replaced in the trench, and, in the process of backfilling, the material should be thor-

oughly compacted by hand or mechanical tampers or with the aid of water used sparingly, dependent upon the chararter of soil and kind of pipes. The wise saying of an old road foreman, that two tampers are required for every shoveler in order to secure satisfactory compaction, should be borne in mind in organizing the flying squadron of experienced laborers.

Except in the case of waterbound gravel and broken stone roads, cement-concrete foundations over trenches should be constructed and such foundations should extend six inches beyond each side of the trench and have a depth of not less than eight inches. If the methods outlined above are adopted, it is not necessary to postpone repaving provided climatic conditions are satisfactory for such work.

If temporary repaving is, for any reason, necessary, it is recommended that the backfilling, as above outlined, be carried to the elevation of the top of the artificial foundation and that such material as small stone blocks, paving bricks laid flat, asphalt block seconds, or hot or cold bituminous concrete should be used for a temporary wearing course.

Repaving.—In the process of repaving, it is recommended that the old pavement be cut back three inches on each side of the new cement-concrete foundation. The adoption of this plan will eliminate planes of weakness and will ensure the practicability of making an efficient bond with the old pavement.

Sidewalks.—The ground beneath sidewalks in municipalities should be kept clear of vaults and other accessories of buildings. The space under sidewalks should be reserved for the possible future installation of pipe systems which would relieve present congestion of subsurface structures in the carriage-way and reduce the number of openings made in pavements.

USE OF TRAFFIC SIGNS*

Purposes for Which They Are Used—Methods of Construction, Materials, and Colors—Danger of Signs as Obstructions.

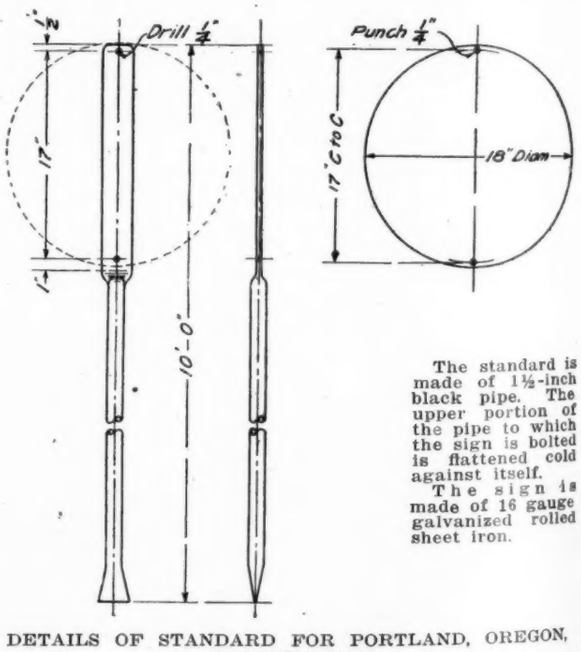
Until recently only the larger cities have been confronted with the problem of regulating street traffic to prevent congestion and accidents, but with the increasing use of motor vehicles even the smallest towns are finding it necessary to give this matter some attention. In these it is impracticable to maintain a traffic officer at each intersection; and in the larger cities also, a great saving is secured where some substitute for a traffic policeman can be provided at any considerable number of points. Consequently many municipalities, both large and small, are using fixed or portable signs for several purposes connected with traffic control, the more common being to prevent cutting of corners at street intersections; to regulate the parking of vehicles; and to give warning of dangerous conditions.

Traffic signs should be uniform in shape and size and carry the least amount of wording which will make the meaning plain. Circular disks from 12 inches to 18 inches in diameter are becoming common, as they are readily distinguished from the advertising signs which are so frequently seen on streets and highways. To be of service, the sign must attract attention and for this reason strongly contrasting colors are used. Red, as the universal danger or warning color, is the one most commonly used, the lettering ordinarily being in white or aluminum letters on a red background, in order that the red may predominate and cause the light color to show plainly on the dark background. Other combinations used are black and white, black and aluminum and blue and white. Signs using these colors are easily read, but do not attract attention as quickly as those using red. W. P. Eno recommends that signs for warning and directing the movement of traffic employ vivid yellow letters or arrows on a black background; while those for designating public parking spaces, cab stands, car and bus stops, etc., have black on yellow background.

The materials most commonly used for these signs are sheet iron and steel, low cost and durability being the arguments in their favor. Sheet iron has slight advantage over steel because of superior rust-resisting qualities.

In a great many cities and towns, traffic posts or signs are placed at the center of the street intersections to make more certain that vehicles turning to the left into another street shall pass beyond the center of the intersection before turning. Some cities have erected concrete monuments for this purpose, others use cast iron lamp posts or sewer pipes filled with concrete, while others use portable signs. The question has frequently been raised whether such signs are obstructions to the street, rendering the municipality liable in case of accidents. As a general rule, slight obstructions made for the sake of general convenience do not render a municipal corporation liable for a resulting injury; and where obstructions are placed in a street for purposes authorized by law or are intended for protection of the general traveling public, they do not in themselves constitute a nuisance, but all reasonable precautions must be taken to prevent injury by them. It would seem probable that the question whether any given post was an obstruction which rendered the municipality liable in case of injury would be a question of fact to be determined by jury. Regardless of the question of liability, most towns and cities at present are using in such locations portable signs which, if run into, are tipped over without damage to the vehicle. Such signs prevent corner cutting just as effectively as heavy permanent ones, cost less, can be removed when desired, and are not likely to cause serious accident if driven into.

Portable standards are usually about five feet high and made so that the instructions "Drive to the right," or some similar notice is visible from each of the four directions of approach. They should be so constructed



The standard is made of 1½-inch black pipe. The upper portion of the pipe to which the sign is bolted is flattened cold against itself.

The sign is made of 16 gauge galvanized rolled sheet iron.

DETAILS OF STANDARD FOR PORTLAND, OREGON, WARNING SIGN.

that they will not be damaged when tipped over. If they are to be left in place at night, they should be fitted to hold a lamp or lantern, unless they are well lighted by nearby street lamps.

*Abstract of a bulletin of the Engineering Extension Department of Iowa State College, prepared by D. C. Faber.

Many municipalities find it necessary to restrict the parking of vehicles in certain districts to prevent the blocking of streets and interference with business. Some prohibit parking in front of hotels, theaters and other places where a large number of patrons arrive or leave by motor vehicles. Others set aside whole blocks where vehicles are not allowed to stand, and some allow parking in the center of the street or on one side only. On account of this lack of uniformity in different localities, areas in which parking is restricted or prohibited should be plainly marked. Mason City, Iowa, uses for this purpose a portable sign 4 feet, 3 inches high with a 12-inch disk, and on the standard just below the disk are two small hooks to which ropes are tied when it is desired to rope off any particular space. These signs cost $3.00 each, complete.

For warning or caution signs marking danger points, bright red disks 18 inches in diameter on permanent posts or standards outside of the traveled portion of the street are very effective. Signs smaller than 18 inches should not be used, as they could not then be read or would not sufficiently attract attention at a considerable distance. Warning signs should be 7 or 8 feet high, and placed 50 to 75 feet from the point of danger. In Portland, Oregon, where several hundred of these are in use, (See Municipal Journal for May 13th, 1915), there is a fixed rule that they be placed on the right hand side of the roadway, one foot back from the curb line, and 50 feet from the point of danger; except that on grades they are placed at the top of the grade. On account of the variety of warnings necessary, it is common to paint these signs on sheet iron or steel. However, porcelain enameled signs with standard wording or special designs can be secured at reasonable prices.

The portable sign on the left is a four-way intersection sign having the letters engraved or milled into the plates. The disks are made of 12 gauge rolled sheet iron, with a border pressed around the edge to stiffen the plate. The letters are cut into the plate with a milling cutter, after which the signs are galvanized and the enamel backed on, and the letters finished in aluminum. For this particular sign, the plates are built up in pairs, back to back, and riveted to a standard 2 inch pipe. By the use of dies, this pipe is flattened to a thickness of about ½ inch in directions at right angles to each other, forming two flat surfaces upon which the four signs may be riveted. The whole is topped with a cast iron ball which prevents rain or snow from entering the pipe. The base, which is made of cast iron, is 18 inches in diameter. The whole sign is 5 feet high and weighs 70 pounds, complete. The selling price is $8.50.

On account of the depressed letters, this sign is easily repainted when necessary.

The sign on the left is made of sheet iron or steel 3-16-inch thick and 14 inches diameter. The letters are formed by shallow holes drilled into the sign and filled with a white composition in such a way that the letters are depressed below the surface of the plate. The disks are galvanized and painted and the letters finished in aluminum. The price of the sign as shown is about $11.

A common style of portable parking sign is shown on the right. The target is 12 inches in diameter, with the letters milled into the plate. The height to the top of the target is slightly over 4 feet. A large part of all the parking signs in use are of this general style, although different processes are used in making up the disk or target.

It is not advisable to attach warning signs to telegraph poles, as they are then liable to be overlooked, but special posts should be used. These are generally of wrought iron or steel pipe set in concrete, or else with a special base which renders the use of concrete unnecessary. Standards and signs should be repainted as often as necessary in order that they may always present a neat appearance.

NATURAL PURIFICATION OF WATER BY FREEZING*

Results of Bacterial, Physical and Chemical Tests by the Minnesota State Board of Health—Recommendations As to Use of Ice.

H. A. WHITTAKER.†

For a number of years, the Minnesota State Board of Health undertook sanitary investigations of ice supplies as a routine procedure. These studies, which included field surveys and analytical results, have failed to demonstrate that ice is an important factor in the spread of communicable diseases. No epidemics of these diseases caused by pollution in ice have been discovered in Minnesota up to the present time. This same view is taken by other sanitary authorities who have studied this problem. Investigations have shown that the danger from ice lies more in the way it is handled during its distribution to the consumer and by the consumer than in the ice itself, provided certain rules are observed in harvesting the supply.

*From "Minnesota Municipalities," published by the League of Minnesota Municipalities.

†Director, Division of Sanitation, Minnesota State Board of Health.

The purification which takes place in water during the process of freezing is well illustrated in Table I. This table represents average results on seven samples of water and ice collected simultaneously from the same sources at seven different localities in Minnesota. The ice samples were clear, solid ice, that would be considered satisfactory for public consumption. The ice was taken from points where the water was at least three feet in depth under the ice at the time of collection. The bacteriological, physical and chemical examinations represent the ordinary standard tests applied to determine the sanitary quality of water for drinking purposes.

The bacteriological results on the water samples from these sources show marked indications of pollution, as represented by high bacterial counts and the presence of B. coli, while the ice samples show exceedingly low bacterial counts and the absence of B. coli, indicating ice of good sanitary quality. The physical results show a marked reduction in the inorganic substances and a partial removal of the nitrogen constituents. These results are typical of numerous analyses on record, showing the purification of water which takes place on freezing.

TABLE I.

Effect of Freezing on Water. Bacteriological, Physical and Chemical Results.

	Bact. per c. c.	B. coli. 1cc.	B. coli. 100cc.	Physical: Turb.	Physical: Color.	Physical: Odor.	Chemical: Total Hard.	Chemical: Alk.	Chemical: Inc.	Chemical: Alb. NH_3	Chemical: Free NH_3	Chemical: NO_2	Chemical: NO_3	Chemical: Cl.	Chemical: Fe.
Water	16000	+	+	13	42	v-2	173	182	8	.699	.286	.008	0.26	5.8	0.7
Ice	5	0	0	4	11	v-1	16	15	4	.407	.122	.003	.002	2.0	0

Table II includes a few results which show an inferior quality of soft, cloudy ice, as compared with clear, solid ice.

The first column represents soft, cloudy ice, collected near the surface of the cake, while the second represents clear, solid ice near the center of the same cake. These results show the need of thoroughly removing soft, cloudy ice from the surface of the cake before the ice is stored or distributed for public consumption.

TABLE II

Soft and Solid Ice, Bacteriological Results.

	Soft and cloudy ice cake; 1 to 3 in. from surface of cake. Bacteria per c. c.	Clear and solid ice cake; near center of the cake. Bacteria per c. c.
Sample No. 1	70	6
Sample No. 2	2600	48
Sample No. 3	1750	46
Sample No. 4	3000	5

The Minnesota State Board of Health considers an ice supply safe for public consumption provided it is harvested in the following manner:

(1) Bodies of water as free as possible from pollution should be selected for the ice field.

(2) The water under the ice at the time of harvesting should be at least three feet deep and free from suspended material of any description.

(3) Ice fields should not be selected at locations where the surface of the ice may be flooded with polluted material which will subsequently become frozen and form a portion of the cake.

(4) The ice should be clear and free from visible foreign material.

(5) Before storing, the surface of the ice should be scraped free from snow, soft ice and foreign material.

(6) Special care should be taken during the cutting to exclude any ice polluted by human or animal excreta.

The Minnesota State Board of Health feels that these are facts the determination of which does not require expert technical advice; therefore, it does not feel that it is necessary under ordinary conditions to send representatives into the field to make such investigations.

BALTIMORE SEWAGE DISPOSAL.

The Sewer Division of Baltimore, Md., in reporting concerning the operation of the sewage disposal plant of that city during 1916, gives the following facts:

During the year the average daily volume of sewage received at the sewage disposal plant, was 39,270,000 gallons, being an increase of approximately 25 per cent over the volume of flow in 1915. The final effluent from the disposal plant was, at all times, stable and odorless, and the operation of the entire plant was satisfactory from a sanitary standpoint. The odors arising from the operation of the plant were noticeably less than in previous years, and as the volume of sewage increases these odors should be still further diminished.

A contract was let to the Heineken Reduction Company, early in the year, under which that company agreed to purchase the sludge produced by the plant, after drying on sand beds. Payments on this contract are based on the weight of material shipped away from the disposal plant, after further drying by the contractor, and the weight of such material shipped, from the beginning of the contractor's operations in May to the end of the year, was 2,527.56 tons. Under the contract, the city reserves the right to sell liquid sludge, as it comes from the digesting tanks, to farmers in the vicinity, and the amount so taken was 4391½ two-horse wagon loads. The total volume of sludge taken during the year by the contractor and by farmers was nearly equal to the entire quantity produced.

The total volume of sewage pumped at the sewage pumping station during the year was 7,654,460,000 gallons, an average of 20,912,000 gallons per day, which is an increase of nearly 16 per cent over the average volume pumped in 1915. The average head against which the pumps operated during 1916 was 71.49 ft., and the average cost of raising 1,000,000 gallons one foot was 5.58 cents, compared to an average cost of 6.293 cents in 1915. The cost of disposing of screenings was 72.8 cents per million gallons pumped, as compared with the cost, in 1915, of 64.3 cents per million gallons pumped, the increase being due to an increase in the quantity of screenings per million gallons and to the increased cost of coal in 1916, compared to the cost of coal in 1915.

WATER IS A COMMODITY.

That the rates charged by a water department should be considered as not for a service rendered, but rather for a commodity sold is claimed by W. H. Lawrence, of Kalispell, Mont., in his annual report. He expresses himself as follows:

It is a well-known fact that the water department of every city is justified in adopting measures to prevent the waste of water.

In the sale of any commodity, and water is a commodity, there must be in all fairness some basic principle upon which its cost of production and sale can be established so that each individual interested may receive equitable results. It is not fair trading to sell at the same price, one family 2,000 gallons of water a month and the next door neighbor 5,000 gallons; yet, such conditions exist where schedule rates prevail. To attempt to set a price on a commodity, the amount of which has not been determined, is a difficult problem for solution; the amount of water is not known, the right to handle the faucet is leased to the consumer and he handles it as he pleases.

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REPAVING OVER STREET TRENCHES.

To every engineer in charge of city pavements, one of the most difficult problems—in many cities undoubtedly the most difficult one—is to keep the pavements uniform in surface at points where trenches have been dug; especially the cross trenches for service pipes dug by public service corporations and plumbers, although the repaving over trenches dug by city forces is by no means always satisfactory.

The experiences of a number of engineers, as well as theoretical considerations of conditions, seem to indicate that the most satisfactory way is to have city employees do the backfilling, under the supervision of a foreman who has demonstrated his ability to secure a thorough compacting of the soil, charging the full cost to the parties making the cut. And then, to make more certain of the result, bridge the trench with concrete which extends at least 6 inches (preferably 9 inches) beyond the trench on each side; the thickness of the concrete varying with the width of trench. If the surface is macadam, the top of the concrete probably should be at the level of the bottom of the metal in the pavement. If there is a concrete base under the pavement, the edges of this along the trench should be beveled back (being careful not to crack the concrete left in place) so as to support the new concrete.

This use of concrete, of course, adds to the expense, but in a city, where traffic demands that the pavement be kept in good surface, this cost will probably be less than the continual patching and tinkering with sunken trenches, to say nothing of the greater satisfaction of a pavement that stays always in good surface.

Other practices in connection with street openings are described in an article on page 305 of this issue, together with a number of recommendations by the author.

BONDING FOR ROAD MACHINERY.

The theory that it is sound financial practice to issue bonds for constructing pavements, the life of the bonds to be the life of the pavement so nearly as this can be foreseen, has been extended by Leominster, Mass., to road machinery. The plan is to issue bonds for $75,000 to be used for this purpose, the bonds to run for from five to ten years, payable in annual installments. William A. Putnam, president of the City Council Committee on Public Service, supports this plan by the argument referred to, viz., that since the benefits to be derived from the machinery will extend over a number of years, the payment for it should be similarly extended.

As an illustration of the desirability of adopting the plan, he stated that the superintendent of streets last year found the road machinery so far worn out that extensive purchases were necessary, and as these had to be made from his regular appropriation, this handicapped him in maintaining the streets as it should have been possible to maintain them with the appropriation made. A considerable saving was made possible by the use of the machinery purchased, however, and the amount of work done by the remaining part of the appropriation was much greater per dollar than would have been possible without the new machinery.

CHLORINE ODORS IN WATER.

A danger is apparently threatening in the many cities of which the citizens are not fully aware. We refer to that resulting from the use of chlorine in the water, introduced by the city chemists for the purpose of killing typhoid bacteria. According to one physician, as described in an article in this issue, chlorine is a poison which causes irritation of the skin and eyes and of the digestive system, many of the symptoms of which are unpleasant to read about, and must be to experience. As a matter of fact, the doctor has drawn it very mild. We have known instances where chlorine has accidentally escaped in the room of the waterworks plant where it was being applied, with effects upon the attendants so serious that they were driven from the room in pain and were not able to return until a thorough ventilation had removed the gas. And this is the dangerous material which our waterworks officials are piping into the homes of all citizens to attack our young babes and the other cherished members of our families!

This thing should stop. And, while we are stopping it, why not make a good job of it and cut off the water altogether. It is a fact which can be substantiated by reliable figures that thousands are drowned in water every year; in fact, we can produce figures to show that numbers not only of infants but also of grown people are drowned in the comparatively small quantities of water found in bath tubs. It must be apparent that any element which is as fatal to human life as this should not be permitted to have entrance to our houses.

For fear some may not otherwise appreciate the fact, we will state that the second paragraph above is supposed to be humorous; but it is not more so than the first paragraph. It is all a matter of relative amounts. Water in quantities as large as an ocean may be dangerous to human life, while by the glassful it is certainly valuable and even essential to it. In the same way, chlorine in large quantities is a highly irritating and dangerous substance to allow at liberty, but when the quantity supplied is so small that, as shown in the article previously referred to, a man drinking eight glasses of water a day for 69 years would in that time receive into his system a comparatively small percentage of the one-half ounce of chlorine that had been applied to such water, a popular clamor against the "poisoning" of the citizens by such treatment

of the water seems to us to have absurdly little foundation in fact or common sense. The taste, and occasionally the odor, which is sometimes given to water by treatment with chlorine is unfortunate, but it is not in the least dangerous, in our opinion; and we believe that the great majority of citizens, if they fully appreciated this fact, would put up with the occasional taste, if convinced of the fact that the treatment which occasioned it was also saving the lives of scores or hundreds of their fellow citizens every year.

CHLORINE WATER DISINFECTION.

The rapid increase in the use of chlorine for disinfecting or sterilizing water has undoubtedly attracted the attention of all who are interested in municipal waterworks. While there are probably no records showing the exact number of cities in which chlorine is being used, it is known that there are at least 150 or 200 of them. In many of the plants no chemist is employed, and neither the superintendent nor the engineer has much knowledge of chemistry or bacteriology, and it is probable that the amount used and general method of treatment employed in such cities is based more or less upon information obtained concerning the practice in other cities. (We expect shortly to give a summary of such information derived from several score cities.) Fortunately, unless the material is used with gross ignorance or carelessness, there is little or no danger of serious results to the consumers.

There is one effect of the use of chlorine, however, which is more or less serious to the waterworks officials, if not to the consumers, in that it brings down upon their heads the general condemnation of all citizens because of the taste which is given to the water, and in some cases it is claimed the odor also. In Milwaukee the papers a few days ago were giving considerable space to the discussion of this matter. One physician of the city (who had previously served as health commissioner, but who displayed a notable ignorance concerning the use of chlorine, when this fact is considered), is reported to have said: "Entire Milwaukee smells to heaven from liquid chlorine that is used to kill the dangerous germs in our lake water. Chlorine is a violent poison and must be handled with care. I, for one, as former health commissioner, do most emphatically protest against our present system of chlorination. * * * The first poisonous or toxic effects of chlorine on the human body are irritation to the skin, mucous membranes and the eyes. It irritates the digestive system by producing symptoms of unrest and heaviness." And so on for several more paragraphs. When physicians make such extravagant statements, it is not to be wondered at that the citizens generally become more or less alarmed when a faint taste of chlorine appears in the water.

That chlorine does give taste to the water can not be denied, but we believe that in many cases the taste is imagined; and in other cases where there is a more or less pronounced taste, it may be due to algae or other causes rather than to the chlorine. In Milwaukee the amount of liquid chlorine added at present is said to be forty ounces per million gallons, or two and one-half pounds. This is not excessive, although it is considerably higher than is used by many cities; this being justified, in the opinion of the superintendent of waterworks and the health commissioner, by the extremely dangerous condition of the lake water at the present time, as shown by the presumptive tests for B. coli. We have recently collected information concerning the use of chlorine from about 100 cities, two-thirds of which use liquid chlorine and the others use hypochlorite or bleach. Of those using liquid chlorine, Valparaiso, Ind., reports using 2.57 lbs. per million gallons; Great Lakes and Rockland, Ill., each report about 3 lbs.; Burlington, Ia., 4 lbs.; Davenport, Ia., 4 lbs. to 8 lbs.; Bangor, Me., 3 lbs.; Wakefield, Mass., 5 lbs; Alpena, Mich., 4 lbs. to 6 lbs.; Ann Arbor, Mich., 8 lbs. to 8½ lbs.; Poughkeepsie, N. Y., 3.4 lbs.; Richmond, Va., 4.92 lbs. This shows that the 2½ lbs. used in Milwaukee is not an excessive amount.

The chemical composition of the water, of course, determines to a considerable extent the amount of chlorine required and also the amount of taste which will be given to the water. But none of the quantities named above are sufficient to cause any danger to consumers, and the amount used is generally and properly determined by that necessary to destroy practically all B. coli, on the one hand, and to keep the cost down, on the other. In Milwaukee the operation is carried on under the direction of the chemist of the water department and analyses are made of both raw and treated water in order to insure the proper dose of chlorine.

During 1916 the average bacterial content of the raw water at Milwaukee was 4,530 per c. c. and the average after treatment with chlorine was 65 per c. c. With reference to B. coli, these were found in 98 per cent of the 10 c. c. samples of raw water and in 23 per cent of the 10 c. c. samples of water after treatment. Certainly the citizens should not object to an occasional taste in the water when they realize that the typhoid death rate has dropped from 45 per 100,000, just before the use of chlorine began, to 11 in 1913, 8 in 1914, 4½ in 1915, and 14.9 in 1916. As the population of the city is about 440,000, this means a saving of 150 lives in 1913, 163 in 1914, 178 in 1915 and 132 in 1916; while the number of cases of typhoid obviated by the use of chlorine was probably at least ten times these numbers, or a total of more than 6,000 during the four years in question.

We do not mean to imply that the taste occasionally given to the water by chlorine is not objectionable. It unquestionably is, and it is to be hoped that some practical method will be found of preventing it. But the inconvenience of this is certainly to be preferred to the loss of life which would almost unquestionably follow the abandoning of the use of chlorine or probably, in all cases where the use is controlled by experts, by any considerable reduction in the amount. Forty ounces per million gallons is one-twenty-five-thousandth of an ounce per gallon, and we question whether in any city the average citizen consumes more than one-half a gallon in a day; and we believe that any unprejudiced physician will admit that four doses of one-two-hundred-thousandth of an ounce each would not be highly injurious to even the most sensitive human organism. To express the figures in a way which will make them more readily appreciable, if a man should drink a half gallon (eight full glasses) of water so treated each day for 69 years, he would during that time have taken into his system water to which had been applied the alarming amount of one-half ounce of chlorine. When we consider, further, that only a comparatively small percentgae of this can possibly reach the consumer as chlorine, but most of it has had all its harmful properties removed by combination with mineral bases and organic matter in the water, the danger to consumers appears to be non-existent.

BRICK PAVING IN THE FAR WEST.

We are informed by the Denny-Renton Clay & Coal Co. that a considerable amount of brick pavement has been laid along the Pacific Coast, which was not included in our tabulations in the February 1 issue. The paving named is 123,000 sq. yds. in Seattle, Wash., about 5,000 sq. yds. in Astoria, Ore., and "a certain amount" in San Francisco. The engineers of these cities failed to reply to our requests for information

METERING KNOXVILLE'S WATER SYSTEM.

Meters for the water services are now being received by the city of Knoxville, Tenn., in large numbers. These are a part of an order for 3,000 water meters recently let by the commission, and with 2,000 meters already on hand will be installed during the spring. It is planned to equip every service with a meter. Commissioner J. G. Crumbliss originated this plan when he was in charge of the water department. The water commission has carried out the details, and now that there is a proposal to reinvest the control of the water department in the hands of the commission the project is expected to be rushed to completion. Department officials say that the work of installing the meters will be commenced as soon as the weather permits. Installation crews will be put to work in all sections of the city. Metering the system is considered necessary by the city officials to prevent the growing waste of water in this city. It is estimated that more than 1,000,000 gallons of water per day are wasted.

SEWER PIPE FAILURES.

Editor Municipal Journal,
New York City.

Dear Sir: Permit me to accept your invitation to answer Mr. A. G. Dalzell's request for information about the reason for sewer pipe failures. To begin at the beginning, it must be recalled that the only reasons ever advanced for the adoption of concrete pipe for sewers are that it favors a local manufacturer, or it is cheaper than the clay. Since the favoring of a local manufacturer is not strictly an engineering matter, and more especially as concrete pipe has never enabled a local manufacturer to carry on business in any one locality permanently, it may be dismissed at the start.

The other reason, about the cheapness, is worthy of consideration. Every material that goes into a good sewer pipe, no matter what it is made of, costs money. The labor also costs money. The only real good opportunity to save money in the manufacture of sewer pipe is to cut down the time element. In order to accomplish this the clay pipe manufacturers have spent a great many years to perfect their machinery and process, and have accomplished wonders over the primitive methods used still in some parts of Europe; but a certain amount of time must be spent in drying and in burning the pipe and this cannot be shortened. The manufacturer of cement pipe has not fared so well thus far in perfecting a process, but has made a special endeavor to save time. One of the principal means he employs to save time is to work with a comparatively dry mix, so that he can remove the pipe immediately from the form and have the form ready for another pipe. This very naturally results in a porous product. If he attempts to work with a wetter mix he lengthens his time, increases his costs and, as his product is heavier per foot than clay pipe of the same diameters, he very soon finds his material per foot costs more than the clay; and at this point he is obliged to quit. The temptation, therefore, is very strong for him to work with as dry a mix as possible and deliver as porous a material as can be accepted.

The first city to make extensive use of concrete pipe was Brooklyn, N. Y. The leakage of 20,000 gallons per mile per day through a 12-inch pipe was found to be such an item in the city consumption of coal for pumping this sewage surcharged with ground water that specifications were finally drawn requiring a practically watertight sewer pipe. At this point the manufacturers of concrete pipe found it expedient to go into the hands of a receiver, and the manufacturer of clay pipe continued as before.

When Kansas City first attempted to use both materials in competition she copied verbatim the clauses from Brooklyn's sewer specifications having to do with watertightness. As a result concrete pipe was used in Kansas City for a few years, but of late the bids on sewer work submitted by the firm which undertook to manufacture concrete pipe have been noticeably lower on clay pipe than on concrete. In other words, the city has discontinued the use of the concrete pipe, although it still builds sewers of a massive monolithic type out of concrete.

The most successful manufacturer of concrete pipe we know of is Mr. Arthur Bent. His recommended practice for making concrete pipe, which appears in the Cement and Engineering News for June, 1914, lays special emphasis on the need of a watertight material. When he bid on concrete pipe for the city of San Diego a few years ago he proposed to fulfill specifications calling for internal hydrostatic pressure tests of at least 40 lbs. to the square inch; but the city engineer, feeling this was more than was required, wrote his specifications requiring a 15-lb. hydrostatic pressure test. When they came to test the pipe five out of eight of the samples tested leaked badly. On account of this the specifications called for testing every piece that went into the sewer. The expense of testing all this pipe and of making it all so as to pass the required tests was so great as to cause the contractor heavy loss on the job, and since that San Diego has used clay pipe.

Following the lead of San Diego, the city of Ocean Beach, adopted concrete specifications. A test made on January 8, 1915, by the city engineer disclosed the fact that out of 22 pieces tested only three were watertight.

Fort Smith, Ark., Tulsa, Okla., Saginaw, Mich., and, in fact, a great number of smaller places have had the same experience with leaky pipe. This shows that your experience is not at all peculiar, nor due to any particular make of machine. The sewer pipe machine at Kansas City is of the very latest, most approved type, but this did not save it from being taken over by the cement companies who supplied the manufacturer with cement.

Failures in concrete pipe such as you describe are in fact due to the fundamental chemical principle that ingredients of cement are soluble in water to a greater or less degree. In Dana's geology you will find the statement that 1,000 lbs. of water, if given the opportunity of close contact, can dissolve 1 lb. of limestone. This accounts for all such phenomena, beginning with the Mammoth Cave, down to the pitting of your cement pipe, the cement being more than half derived from limestone. To prove that cement is no exception to other limestone products in this respect, you will find on page 46 of the Cement and Engineering News for February, 1917, the assertion that "the passage of soil water through the tile wall will gradually dissolve some of the cement in the material."

Coming now to the failures of clay pipe: These are, of course, from entirely different causes. They are not due to the deterioration of the material itself, but simply to overloading it. Clay pipe, like any other pipe, will break if overloaded. Every preacher knows that it has been used without deterioration since the days of Babylon; and every druggist knows that it is chemically inert because the acids which he carries in stock are contained in clay jugs. Therefore, whenever we successfully avoid overloading the clay pipe we are able to attain the ideal permanent sewer.

Formerly there were two very good reasons why clay pipe, among others, was overloaded. The engineers were not able to tell the manufacturers how much load the earth and the traffic were going to exert on it. The manufacturers being in competition with themselves and other materials, without any rules to go by, made the pipe too thin in many cases, or were often required to furnish it for places where they were unacquainted with the loads to be placed upon it. These two reasons have now been overcome. The American Society for Testing Materials has made a very successful study of the loads coming on sewer pipe. They have found a great deal depends on the way the pipe is bedded. For instance, a pipe placed on a rail or bar supporting it at one point along its bottom will carry only two-thirds the load which can be carried by a pipe resting on an even, dry sand bed which supports the lower quarter of it. If this yielding dry sand bed is replaced by a firm one, which fits it exactly, the bearing power will be doubled again; so that the possible bearing strength developed by a sewer pipe varies 300 per cent, according to how well the engineer lays it, irrespective of the material it is made of.

In addition to discovering these facts and the amount of load to be expected in such cases, according to depth and width of trench, the American Society for Testing Materials has also prescribed test loads and methods of testing, so that the engineer now has no excuse for not knowing exactly how much his pipe will be called on to stand, and whether or not it can do so. From now on all an engineer has to do to guarantee permanent sewers to his clients is to select material of known chemical inertness and permanence, and test it before using according to standard methods. Your truly,

BENJAMIN BROOKS,
Engineer, International Clay Products Bureau.

The WEEK'S NEWS

State Highway Work in Minnesota, Washington and Maine—Control of Contagious Diseases in New York Cities—Sewerage Plans for Scranton and Ferndale, Pa.—Death Rate of Cancer in U. S.—Pittsfield's and Sandusky's Waterworks Finances—Municipal Utility Profits in Richmond, Ind., Mishawaka, Ind., and Hamilton, O.—Fires in El Paso, Boston, Minneapolis, New Britain and Uniontown—Sandusky's Mayor Found Not Guilty—Connecticut Commission on Taxation Reports Important Recommendations—Car Accidents in Toledo, New York and Lawrenceville, N. J.

ROADS AND PAVEMENTS

State Highway Work in Minnesota.

Minneapolis, Minn.—George V. Cooley, secretary and chief engineer of the commission, in preparing figures for his annual report, says the state road system is a bigger business project than any railroad in the state. The grading done in 1916, 1,860 miles, cost $1,674,016, and the surfacing $1,063,346, he says. The 12,000 miles of state road were maintained during the year at a cost of $726,427. There were 6,383 culverts placed at a cost of $342,920, and 192 bridges at a cost of $528,103. The work is done in 86 counties. There are 93,000 miles of road in Minnesota and the state has direct supervision over 12,700 miles of state road, including practically all the main market highways.

"City Engineer Week."

Austin, Tex.—"City Engineer Week," held in conjunction with the "Home Economics Week," at the State University, proved a successful attraction. This meeting was held in response to a call of dean T. U. Taylor, of the department of engineering of the University of Texas, and was participated in by city engineers and other city officials from all parts of the state. A. M. Bowles of Dallas spoke on "Concrete Roads," and Fred Righter of Austin on "Bitulithic Paving." A tour of the streets of Austin was made after the lectures. The entire gathering of engineers visited San Marcos to inspect the activated sludge plant there after the system was described.

The State Highways of Washington.

Olympia, Wash.—The sixth biennial report of the state highway commission made to the governor by James Allen, state highway commissioner, contains several interesting recommendations. Mr. Allen suggests (1) That no new state roads be established until the present system of state roads is completed. (2) That the apportionment to the various highways of the amount appropriated from the Public Highway Fund for the survey, construction and maintenance of primary and secondary highways of the state be left entirely in the hands of the State Highway Board. (3) That chapter 59, Session Laws of 1915, be modified to provide that 10 per cent of the taxes collected from the one mill levy for the construction and repair of state highways and bridges shall be set aside by the state treasurer and used exclusively under the direction of the highway commissioner for the repair and maintenance of state roads that shall have been established and constructed. (4) That 25 per cent of the surplus of all automobile license fees collected by the Secretary of State over and above the expenses of the issuing of such licenses be placed to the credit of the Public Highway Fund for the maintenance and repair of primary state highways, and to be expended under the direction of the State Highway Commissioner and upon vouchers appproved by him. (5) That the permanent highway acts requiring that all permanent highway contracts be awarded on the lump sum basis be changed to provide that the contracts may, at the option of the Highway Commissioner, be awarded on the unit price basis. (6) That the five state rock quarries be disposed of at the earliest possible date. The state primary roads now total 2,112 miles and the state will have 1,181 miles of secondary roads under the present schedule. Of the primary highways practically 1,500 miles are completed and of the secondary roads about one-third of the mileage is completed. By following out the second recommendation the appropriation will be expended on such sections of state roads as are most in need of improvement, and will assure the completion of the system of state roads at the earliest possible date and in a most economical manner. During the present year but two state quarries were in operation at all and these together with others are rapidly deteriorating through idleness caused principally because of radical changes in recent years in the types of road construction, which leaves little demand for the products of the quarries. The disposal of the plants while the machinery is yet in condition to bring a fair price is suggested as the only logical solution of the problem.

Low Overhead in State Highway Expense.

Augusta, Me.—A statement showing that the expenses of the state highway department for supervision are only 6.63 per cent. of the gross expenditures of the department has been made by chief engineer Paul D. Sargent of the department. In the year 1914 the supervision charges of the department were made up as follows:

Administration	$39,117.86
Engineering	55,801.99
Inspection	19,049.92
Total	$113,969.77
Labor and material charges:	
Maintenance	$ 87,772.89
State aid construction	602,954.89
State highways	785,742.54
Registration of automobiles	16,515.69
Special appropriations	19,800.50
Total	$1,592,786.51

The supervision, therefore, equals .07155 of the net expenditure for labor and material, or .0663 of the gross expenditures under the supervision of the department. In 1915, the department made the following showing:

Administration	$38,549.79
Engineering	39,458.73
Inspection	16,927.99
Advertising	331.53
General expenses and right of way	1,178.21
Total	$96,442.25
Labor and Material:	
Maintenance	$165,716.20
State Aid Construction	544,221.61
State Highways	531,729.83
Registration of automobiles	10,259.32
Special Appropriations	70,532.43
Total	$1,322,459.39

During the year 1915 the supervisory expense was therefore .07292 of the net cost of labor and material, or .06796 of the gross expenditures supervised by the department.

SEWERAGE AND SANITATION

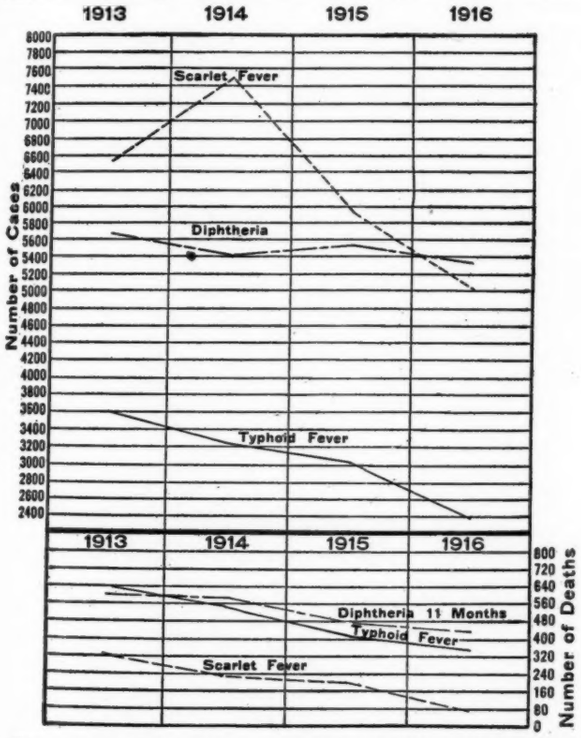
Preparing for Infantile Paralysis.

St. Paul, Minn.—St. Paul has begun an organized campaign of sanitation and precautionary measures to prevent reappearance of infantile paralysis. This is in line with similar action being taken by New York, Chicago and other large cities, which fear a return of the plague. In Chicago seventy-five representative professional and business men have formed an association for preventing the disease. A similar committee is suggested for St. Paul. The city health bureau has prepared a special group of regulations calculated to help stem a possible breaking out of the disease. Dr. H. M. Bracken, executive officer of the state department of health, has asked the legislature for an appropriation of $13,000 to combat the disease in the state. The Minnesota Public Health Association is preparing to

assist in fighting the malady. "We are watching for every loophole that might be favorable to another siege of infantile paralysis and have been working for months on special health measures," said Dr. Justus Ohage, city health officer. "Usually after an epidemic has appeared one year it crops out again the next. We believe that improvement of all health measures should deter infantile paralysis and we have prepared a group of new regulations for the handling of meat, cream, milk and other foods with this in view. The St. Paul Association, the Women's Civic League and other organizations are co-operating." The department of education will examine school children. "The commissioner, superintendent and myself decided informally some time ago to hold infantile paralysis tests similar to those which were given at the opening of school," said Dr. E. A. Meyerding, school physician.

Smallpox Epidemic Increasing.

Little Rock, Ark.—A quarantine of Clay and other counties of northeast Arkansas and the demanding of health certificates from persons coming from Missouri to Arkansas may be measures taken by Dr. C. W. Garrison, state health officer, in fighting the epidemic of smallpox in that section.



HOW SCARLET FEVER, TYPHOID FEVER AND DIPHTHERIA ARE BEING CONTROLLED.
(Cases and deaths in New York State, exclusive of New York City.)

Dr. Garrison has written the health department of Missouri calling attention to the situation and advising that unless something is done to relieve the condition, the Arkansas health department will require health certificates of persons entering Arkansas from southeast Missouri. Dr. M. C. Hughey, Clay county health officer at Rector, has sought the assistance of the state department in combatting the epidemic, which, he says, is very serious in the entire section. Dr. Garrison says that fifty cases of smallpox are under quarantine, in Clay County, some of them in Rector. Counties across the border in Missouri are suffering greatly from the epidemic, he said. A general warning has been sent out by Dr. Garrison to residents of Rector and Clay and other counties in that section. The warning says that persons exposed to smallpox are required to be vaccinated or be quarantined for a period of fourteen days. Violation of this law is punishable by a minimum fine of $10 or imprisonment. Dr. Milton Vaughan, chief of the city health department, said that there are eight cases of smallpox in Little Rock. He has warned physicians against the mild form which the disease has been found in cases thus far reported, as in some instances it has been mistaken for chickenpox, and the proper precautions have not been taken.

Expert to Plan Sewage Disposal.

Scranton, Pa.—Alexander Potter, of New York city, consulting sanitary engineer, now engaged in building an extensive sewerage system in Hanover township, Luzerne county, for the Delaware, Lackawanna & Western Railroad Company, has been engaged by Mayor Jermyn to assist director W. G. Robertson, public works department, in completing the plan for the comprehensive sewerage system as called for by Dr. Samuel Dixon, state commissioner of health. The plan should be in the hands of the commissioner by October 1. Mr. Potter has been engaged at a contract of not more than $5,000, the limit the council has appropriated for the plan. He is to give his services in an advisory capacity at a rate of $50 a day for his personal work; $20 a day for his chief assistant and $10 a day for such others of his staff as may be required. The preliminary plans for the plant have about been completed under the direction of William Shunk, the city engineer.

Health of New York Cities.

Albany, N. Y.—A recent announcement by the state department of health states that there was in the state, exclusive of New York city, a decrease of over 1,000 cases of diphtheria in 1916, as compared with 1914; of over 3,000 cases of scarlet fever and over 1,000 cases of typhoid. The following are the rates per 100,000 population:

	1913.	1914.	1915.	1916.
Typhoid Fever	14.5	11.9	9.5	8.1
Measles	9.8	6.1	4.6	9.5
Scarlet Fever	7.3	5.1	3.7	1.7
Whooping Cough	8.9	9.8	7.8	8.8
Diphtheria	11.5	11.4	10.6	10.3

The 1916 figures are for 11 months. With the exception of measles, which was of epidemic prevalence last year, these are the lowest rates the state has attained since its registration statistics have been sufficiently complete to be dependable and show the excellent record of control.

Plans for Sewerage System.

Ferndale, Pa.—Plans for a sanitary sewer system for Ferndale borough have been completed by civil engineer L. R. Owen, of Johnstown. Mr. Owen is now preparing a report and estimate of the cost of such a system, to be submitted to the council, and the plans, if approved, will then be forwarded to the state department of health. Mr. Owens' plans are for a system covering the entire borough of Ferndale and the drawings show a connection with the proposed Johnstown sanitary sewer system at Moxham. With a connection with the Johnstown system, Ferndale will not need a disposal plant. "All surrounding boroughs," said Mr. Owen, "will eventually empty their sewage into the big Johnstown system." Mr. Owen recently completed plans for a sanitary sewer system for Windber. The plans were approved without change by Windber council and will be sent to the state department of health for similar action.

Cancer Death Rate.

Washington, D. C.—Statistics of deaths from cancer and other malignant tumors in the registration area of the country, prepared by the United States Bureau of the Census, show that the death rate from these causes has steadily increased during the past 15 years. It was 63 per 100,000 in 1900, and in 1914 was 79.4 per 100,000. The registration area contains approximately two-thirds of the total population. Among the States, the lowest five rates—45.8, 46, 48.9, 51.5, and 57.8 per 100,000 population—are shown for Utah, Kentucky, Virginia, Montana and North Carolina, respectively; and the highest five—109.9, 107.6, 101.2, 100.8, and 97.9—for Vermont, Maine, Massachusetts, New Hampshire, and California, respectively. (The rate for North Carolina relates only to places which had 1,000 or more inhabitants in 1910.) At least a part of the difference between the high and low rates is accounted for, first, by the fact that in some States the average age of the popula-

tion is considerably greater than in others, cancer being a malady much more likely to attack persons at advanced ages than those in the earlier period of life; and, second, by the fact that in several of the States named there are considerable proportions of colored population, among whom the mortality from cancer is apparently lower than among whites. The death rate for whites throughout the registration States was 80 per 100,000, as against only 56.2 for the colored population. The death rate from cancer among women, 96.8 per 100,000, was more than 50 per cent greater than the corresponding rate for men, 62.4. For persons under 25 years of age the death rate was only 2.8 per 100,000 corresponding population, but for the higher ages it is very much greater, increasing rapidly from each age group to the one next above. Deaths due to cancer of the stomach and liver represent more than three-eighths of the total.

WATER SUPPLY

Burst Main Floods Large Area.

Cleveland, O.—A large area of streets was flooded to a depth of two feet, factory foundations undermined, basements deluged, street car passengers marooned and three car lines put out of commission when a thirty-six-inch water main burst. A waterspout that at one period reached a height of twelve feet tore a great gap in the pavement, washed a car off the tracks, demolished strong fences, caused property damage estimated at thousands of dollars and wasted, it is reported, 15,000,000 gallons of water. The probable cause of the burst, according to Thomas S. Farrell, director of public utilities, was an earth settlement due to frost that caused a cavity to form beneath the main and a joint to crack. E. G. Troutwine, investigating officer for the city law department, made an appraisal of the damage.

Waterworks Finances.

Pittsfield, Mass.—The board of public works in its annual report to the city council recommends that the discount for prompt payment of water rates be reduced from 20 per cent to 10 per cent, thus adding $13,000 to the estimated revenue for the coming year. The report shows that since 1891, $340,403.80 has been taken from the water department receipts and applied to other accounts of the city. Service connections numbering 139 were made in 1916, the smallest number in many years. Most of them were in the Pontoosuc lake section, to which the water was extended a year ago. The sum of $136,394.26 was received from water rates, the sum of $30,711.06 was expended for water main extensions, $19,880.78 for maintenance of works, $60,482.50 for interest on debt and $82,200 was paid on debt.

Report on Water Metering.

Aberdeen, S. D.—City engineer Frank LeCocq has submitted a report to the city commissioners on the water meter system now in use in the city. Out of the 995 metered services which have been in use for one year, 823 have sewer connections and formerly paid $7.50 per year under the old flat rate. Seventy of them have no sewer connection and paid $5.00 per year while 102 are commercial users paying from $7.50 to $185.00 per year on the old flat rate. A table shows that $6,585.43 was collected from 823 metered services, which formerly paid $7.50 per year or a total of $6,172.50, thus making an increase of $412.93 on the 823 services; $360.62 was collected from seventy metered services, which formerly paid $5 per year or a total of $350, making an increase of $10.62 on the seventy services. Forty-five per cent of the 102 commercial metered services paid less than they did under the old flat rate while fifty-five per cent paid considerably more; $3,040.96 was collected per year formerly from the 102 services under the flat rate while under the meter rate, $4,985.50 was collected in one year, making an increase of $1,944.54 on the 102 services. On an average, the residences which formerly paid $7.50 per year are now paying only fifty cents per year more on the meter rates. Those which formerly paid $5 per year are now paying only 15 cents more on the meter rates. The largest increase has been obtained from fifty-five per cent of the commercial users who have paid $1,944.54 more on meter rates, which is an increase of 63.8 per cent over the flat rates. "So far the meters have given good results and in only a few cases has a meter been found which was stuck and not registering. The waste that existed before the meters were installed has been greatly reduced. Formerly the pressure on the mains dropped to about thirty pounds during cold nights, while at the present time, with the same number of wells, the pressure never falls below about seventy pounds, showing that not such a large quantity of water is being wasted."

Sandusky's Water Works.

Sandusky, O.—A net gain of $7,045.28 in water works receipts for 1916 over service collections of the previous year has been announced by auditor-treasurer Westcott. The 1916 collections, amounting to $69,597.58, were the largest in the history of the department. In addition to increased rentals, a big gain, officials say, is manifest through other sources, chiefly the discovery and closing of leaks in the mains. Holes in pipes, allowing the escape of approximately 1,500,000 gallons of water per day, were closed during the past summer, during the course of the water waste survey advocated by manager Ward and the commission. During 1915 total water rentals amounted to $62,531.30. Net earnings of the water works department for 1916 will be slightly under those of the previous year, due to the increased cost of filtration chemicals, labor, repairs to machinery, etc.

Progress on Waterworks Construction.

Lansing, Mich.—Progress on the two reservoirs which when completed will have a combined capacity of 7,000,000 gallons of water is being made as rapidly as the weather will permit and it is expected that one of the big tanks will be ready for service in July. Under the present system the city is consuming water at a rate in excess of the pumping capacity of the plant and the old stand pipe is inadequate for storage for the water 60,000 people are using each day, while the pressure at the manufacturing plants is insufficient for dependable protection through the sprinkling systems. A fire of long duration, coupled with the usual consumption of water in the homes and factories, would find the plant unable to carry its added burden. A pump capable of increasing the constant pressure on the mains far above the attempted average of 60 pounds is to be installed. A program of main extensions and reconstructions, to cover a period of four years at a cost of about $15,000 yearly, is to follow the completion of the reservoirs. A bond issue of $165,000 was voted for the work now under way. The costs are as follows: Reservoirs, $76,000; suction lines for plant, $46,000; pumping engines, $26,000; building, $20,000; boiler for pump and smoke stack, $16,000. Other expenses incurred during the work bring the cost well up to $176,000. The distribution mains from the plant now are inadequate, according to G. G. Crane, manager of the city's light and water departments, who is directing the project. The tanks are to be circular, each with an outside diameter of 160 feet. They will be about 25 feet in depth and of reinforced concrete construction.

Water Rates Equalized.

San Diego, Cal.—Equalizing of all rates for consumers of the Cuyamaca water system is effected by a ruling of the state railroad commission on its hearing of the company's application, which was held some time ago. The decision also holds that the Cuyamaca is entitled to approximately 10 cents per 1,000 gallons for all water purchased by the city of San Diego. The decision makes a minimum of $1 a month with 8 cents as the minimum price per month per 100 cubic feet, and 25 cents as the maximum for the same amount where less than 1,000 cubic feet is used. When the present company took the system over in 1910 it found the former owners had contracted for the sale of water at probably 20 different prices, one man paying $30 an inch; his neighbor $45; another $60, and as high as $75 an inch for the same service; while other people were paying at rates of 4 cents a thousand gallons to 10 cents per thousand gallons, as the contract happened to call for. The railroad commission's decision has eliminated all this discrimination and inequality of prices. A week previous the supreme court of the state of California rendered a de-

cision in a case similar to that of the Cuyamaca company, giving the state railroad commission full authority to change the rates at which water shall be sold regardless of existing contracts, where public policy demands it. In the decision of March 28, 1913, the state railroad commission determined that a reasonable maintenance and operating expense for the Cuyamaca system was $21,000 per year. The decision just rendered allows $48,000. The irrigation system rate has been practically doubled, while in some other cases, for domestic supply, it has been reduced. In the railroad commission's decision of March 28, 1913, it allowed as a reasonable gross revenue $66,825.03, while this decision just rendered allows $134,693.08, providing La Mesa dam is built to a height of 100 feet. The rates established are:

Minimum payments for each service connection in use: Inside diameter, ¾ inch and less, $1 per month; inside diameter 1 inch, $1.25 per month; inside diameter 1½ inches, $1.75 per month; inside diameter, 2 inches, $3.25 per month; inside diameter, 3 inches and larger, $4 per month.

General use (price per 100 cubic feet per month):

Up to 1,000 cubic feet, 25 cents; between 1,000 and 5,000 cubic feet, 15 cents; between 5,000 and 100,000 cubic feet, 12 cents; above 100,000 cubic feet, 8 cents.

Irrigation use: Above 2,000 feet, 2½ cents per 100 cubic feet per month.

Public use: Fire service, per hydrant, per month, $2; street sprinkling and sewer flushing, 12 cents per 100 cubic feet per month.

Other public use through separate services at general rates, one minimum for each service.

STREET LIGHTING AND POWER

Business of City Plant Increases.

Richmond, Ind.—An increase of approximately 20 per cent in the business of the Richmond municipal electric plant in 1916 over that in 1915 is shown in the report for the past year by superintendent Clarence Kleinknecht. Exclusive of the amount paid for the purchase of the electric plant of the Richmond Light, Heat & Power Co., amounting to $213,042, the municipal plant showed net earnings of over $70,000 last year. The report, in brief, follows:

Operating revenue	$186,657.32
Non-operating revenue	21,044.46
Total income for 1916	$207,701.78
Expenditures.	
Operating expenses	$ 74,660.32
Building equipment	264,634.68
Paid Sinking Fund	10,660.00
Total 1916 expenditures	$349,955.00
Municipal Fund.	
Balance on hand, Jan. 1, 1916	$ 80,654.57
Paid into fund, 1916	464,541.13
Total	$545,195.70
Paid out during year	485,177.92
Balance, Jan. 1, 1917	$ 60,017.78
Sinking Fund.	
Balance, Jan. 1, 1917	$ 6,048.58

Exclusive of the expense for building and equipment, which was abnormally heavy last year because of the purchase of the private plant and extensive betterments and equipment increases, the total receipts showed an excess of $133,041.46 over operating expenses. The per cent of operating expenses to revenue was only 40. After deducting 3 per cent for depreciation the plant valuation the first of this year was estimated to be $596,925.01. The total operating income for twelve months ending Dec. 31, 1916, was $186,657.32, of which $45,000.00 was obtained from the acquisition of the private plant. For these twelve months the average income per k. w. h. sold was 0.0310—1,410,658 k. w. h. was the amount of business received from the private plant for the nine months' operation. The cost per k. w. h. generated and delivered was 0.01236, which would make the total operating expense of the business obtained from the private plant $17,435.73. The cost per k. w. h. generated and delivered was 0.011135, according to the amount of money expended during the year. The actual operating expense for the year 1916 should be $81,874.64, the difference being in the cost of coal actually consumed and that purchased. After deducting the operating expense from the additional load obtained from the private plant a profit is found of $27,564.27 for the nine months' operation, or 17 per cent plus on the amount paid for their property. The cost of production is a little over 0.006 per k. w. h. and it is hoped that after the new equipment is in operation to bring the cost of production down to 0.004 per k. w. h. at the switchboard. There has been sold $23,549.77 worth of equipment from the private plant. Adding $75,000 for used material to the city plant and $40,000, the amount that will be realized from the sale of the old equipment, is $115,000; and subtracting $115,000 from $212,891 the total amount paid for the private plant would make $97,891, which the city paid for $60,000 worth of business annually.

Municipal Plant Profits Increase.

Mishawaka, Ind.—Mayor Ralph W. Gaylor has transmitted to the city council the reports of the superintendent of the electric plant for the years 1914, 1915 and 1916. An excellent showing is made by this department. The figures below are based on the value of the plant as shown by a complete detailed inventory, and ample charge has been made against the gross earnings for interest on the investment and for depreciation of the plant.

Year.	Value of Plant.	Charged Off for Interest-Depreciation.	Profits.
1914	$100,000.00	$10,350.00	$5,058.33
1915	101,245.27	12,265.66	9,535.18
1916	115,941.16	15,311.76	14,053.98

The steady increase in the profits of this department is very satisfactory considering that on March 1, 1915, the 10 per cent reduction in electric rates, ordered by council, went into effect. This reduction resulted in an annual saving of more than $5,000 to the customers of the electric plant, with corresponding loss in revenue to the department. When the present administration came into power an audit of the books of the electric department showed unpaid delinquent electric bills to the amount of $7,536.14. Collections in the electric department during the years 1914, 1915 and 1916 amounted to $152,158.39 and the losses in that department for these three years amount to only $306.17. When the administration came into power January 5, 1914, there were but 1,814 customers in the electric department. During the three years just closed there has been an increase of over 500 customers in this department, making a total of 2,323. Mayor Gaylor says: "To bring this service within the reach of a still greater number of our citizens, I want to recommend to the board a further reduction in the rates for electric current and that prompt action be taken to place the new rates in force at the earliest date possible."

Finances of Municipal Plants.

Hamilton, O.—That Hamilton's three municipal plants were operated at a net gain of more than $120,000 during 1916 is indicated in the annual report of city auditor E. E. Erb. This total includes an estimated value of free service furnished by the municipal plants, but does not take into consideration interest on the debt of the plants or depreciation. Erb's reports show the gas plant broke about even, while the electric and water departments made money. Following are the reports, in substance: The total ordinary expenses of the gas plant were $113,917.78, of which $96,776.02 was spent for gas. Extraordinary expenses were $4,756.25, making the total expenses $119,919.66 and the total receipts $125,100.87, the gain in actual cash being $5.181.21. To this should be added the extraordinary expenses, which are made for plant extensions and improvements, and are really an asset, making the total gain for the year $9,937.46. But there is an unpaid gas bill amounting to $10,370.58, which leaves the gas department with a deficit of $433.12 for the year, without considering interest on the bonded debt or depreciation. The ordinary expenses of the water department for the year were $37,584.44 and the extraordinary expenses $4,337.59, which with some refunds made the total expense of the department $41,929, while the receipts amounted to $61,463.44, making a net cash gain for 1916 of $19,534.44. Adding the sum spent for

extraordinary expenses, such as extensions and improvements and the net gain of the department for the year becomes $23,872.03. It is estimated that free water service furnished to other city departments is easily worth $30,000, which makes the department's gain nearly $54,000. This free service includes water for fire hydrants, sewer flushing and water for public buildings, including schools. During the year $20,000 was turned over to the sinking fund trustees from the surplus in the water fund. This report does not take into consideration interest on the bonded debt. The present debt is $262,500. Depreciation is not considered. In the electric department the total ordinary expenses were $43,451.82, while the extraordinary expenses were $4,262, making a total of $47,724.82. Receipts totaled $78,263.45, making the net cash gain for 1916 $30,538.63. Adding to this the sum spent for extraordinary expenses, for extensions and so forth, and the net gain for 1916 becomes $34,800.63. Again there should be added to the gain the sum of $35,000, which, it is estimated, is a fair cost for free street lighting, and this would make the total gain of the department nearly $75,000. At present the plant receives no actual credit for this free street lighting. Interest on the debt of the electric plant and depreciation are not considered in this report. The present debt is $185,000.

FIRE AND POLICE

Hard Fight at Lumber Fire.

El Paso, Tex.—Property loss estimated at $225,000 was caused by a fire which swept a big woodworking plant and an adjoining factory, and destroyed 14 carloads of hay. Five firemen were slightly hurt while combating the flames, but were able to return to their work immediately. Fire chief John W. Wray stated that the fire was undoubtedly the largest that has occurred during his two years in El Paso. "We were handicapped by the wind, which shifted on us," said chief Wray. "The heat was so tremendous and the flames spread so rapidly that we were unable to check the fire at one point before it would break out again." Fanned by a stiff wind from the north, the flames spread rapidly and the roofs of many houses caught fire. The heat was unusually intense and the houses on the other side of the street blazed up from the heat, rather than from the sparks. Seven sections of hose were burned by the heat of the fire. The paint on frame buildings several hundred feet away from the blaze was blistered. Heat caused the right trouser leg of fire chief John Wray to burst into flames as he directed his men, shortly after the response to the fire. The burning clothing was extinguished before it caused injury.

Theater Fire Ties Up Traffic.

Boston, Mass.—Boston faced the worst traffic tie-up in its history as a result of the fire that destroyed the old Columbia Theater and the adjoining Grace Building. For a whole day no elevated trains could run past that point because of danger from the weakened walls of the six-story Grace Building. Work was begun immediately on razing the walls. President Matthew C. Brush, of the Boston Elevated Railway Company, stated that, because the day after the fire was a holiday, travel was light and was easily handled past the blockade by surface lines. Acting mayor James J. Storrow spent the day at the scene of the fire with building commissioner O'Hearn. A detail of men from Ladder 13, in charge of district chief Walsh, was at work directing a stream of water from the roof of the Grace Building when the roof fell in, but the men had heard the warning sounds and got to safety before the crash. Life-line guns were used to shoot lines from the roof of the Grace Building to the old towers on the theatre, so that they could be pulled down. An effort was made to push the towers over with the hose streams, but there was not sufficient pressure. The water towers did the best work at the fire in checking the spread of the flames. Many hose lines were operated from the elevated structures, after the power was turned off. The ten-story Jaynes Building is adjacent to the Grace Building. This structure is of fire-retarding material, but the window frames are of wood and the glass is not wired. Flames leaping from the windows of the Grace Building shattered the glass in all the upper doors of the Jaynes Building and the heat operated automatic sprinklers on practically every floor so that the structure was flooded. Firemen broke the glass in the doors of the elevator wells at each floor and permitted the water to escape in this way, with the result that the cellar was flooded. Commissioner O'Hearn stated that the law permits the use of wooden window frames and unwired glass in such buildings and that these practically offset the fire-proof construction of the building itself. The total damage by the fire is estimated at $200,000.

All Apparatus Called at Big Store Fire.

Minneapolis, Minn.—Swept by a gale which endangered the downtown district, an early morning fire destroyed the Narragansett building, with a loss estimated at half a million dollars. The structure was completely gutted. Smoke and water were responsible for the principal loss in some of the stores, stock rooms in the basement and sub-basement being flooded, ruining thousands of dollars' worth of merchandise. Because of the high wind the fire for a time threatened the entire block, and every piece of fire apparatus in the city was called out as a precautionary measure. Thirty firemen were treated for partial suffocation. Firemen groped their way about, unable to see before them, until, fully an hour after the alarm was turned in, the smoldering fire burst into flames. The origin of the blaze is uncertain. A temperature drop shortly after the fire began hampered the firemen, whose uniforms were soon coated with ice. Hose burst many times.

Policemen to Study Law.

New York, N. Y.—The Police Bulletin, the official monthly magazine of the force, announces that fifty men will enter a course in the study of law at the Columbia University on March 1. There are no college entrance examinations, but most of the men who have signified their desire to learn the law are high-school graduates. They will not be given a degree and the fees are very small—$16 for the entire course, and $8 for the books.

The Swissvale Fire.

Swissvale, Pa.—Insurance company inspectors and engineers are investigating the recent $4,000,000 fire at the Union Switch & Signal Co.'s plant, particularly the reason for the failure of the water supply from the hydrants and fire lines of the company. The Pennsylvania Water Company, Wilkinsburg, Pa., furnishes fire protection to the borough of Swissvale, and the adjoining borough of Edgewood. This supply did not fail and there were no frozen plugs on the company's lines and there was no delay in getting streams at work from this supply. The first reports, printed in our last week's issue, regarding the failure of the water referred only to the supply of the factory and not to the Pennsylvania company's supply.

Run of Fires Scares New Britain.

New Britain, Conn.—Eight fires, seven of which are believed by the authorities to have been of incendiary origin, caused an aggregate loss of about $36,000 in New Britain within two hours, and scared the citizens, who feared that conflagrations and explosions would break out any time. The fire departments of Hartford, Waterbury, Bristol and Plainville were called for assistance and they responded. Both of the city's companies of the state militia and the entire police force were called out to guard public buildings, factories and tenements in the congested districts against possible further operations of firebugs, and they remained on duty several days. All the fires were within a limited area, from 300 yards to a quarter of a mile from one another. At the outset citizens knew that an incendiary was at work. Had it not been for prompt work of firemen and apparatus from nearby places the local firemen would have been unable to cope with the situation. Seven men arrested as arson suspects were all released. Neither the police nor the firemen have any clue to the incendiary or the exact means used to start the fires. The chief theory is that a mental defective is the culprit.

Business Section Threatened by Fire.

Uniontown, Pa.—Fire which threatened the destruction of the business section started in the Johnson-Fulton building here, and caused $250,000 damages before it was got under control. Frozen water plugs handicapped the firefighters. Despite the fact that seven fire companies—Brownsville, Scottdale, Connellsville and other companies aiding the Union brigade—were on the scene within an hour and a half after the fire started, they were unable to combat the flames. It was necessary for the firemen to thaw frozen plugs before a stream of water could be directed on the building. A hotel and a theatre were destroyed. Street car traffic was held up and the city was virtually cut off from surrounding towns. The power went off when the fire ate through the feed wires.

GOVERNMENT AND FINANCE

Cities Organize to Keep Utility Control.

Austin, Tex.—At a meeting of officials of Texas cities held here, the assembly went on record as being unalterably opposed to the Lattimore public utilities bill and as favoring the Dean bill changed so as to give the Railroad Commission jurisdiction over telephone rates only on long-distance service. The cities favor retaining supervision over local service and charges. Those present included: Henry D. Lindsley, Dallas; city attorney Charles F. O'Donnell, Dallas; mayor Charles Alvis and councilman J. E. Abrahams of New Braunfels; mayor J. R. Nail, Cleburne; mayor J. B. Marmion, Houston Heights; mayor J. Z. Keel, Gainesville; mayor Burton Prince, Waxahachie; mayor Ferris, Ennis; mayor Tom Mayers, Gatesville; mayor F. N. Drane, Corsicana; mayor Clinton Brown, San Antonio; acting mayor A. C. Bratton, city attorney R. E. Lee, Brownwood; mayor J. K. Campbell, city attorney N. P. Woodward, H. G. Waggoner and R. O. Gresham, Temple; mayor Finch of McKinney and a number of other officials. Henry D. Lindsley was elected chairman of the meeting and W. C. McGintie was elected secretary.

Commission Form Wins by Women's Votes.

Champaign, Ill.—While the men voted against changing the city's government to the commission form a large majority of the women voted in favor and the election was carried by their votes. The men voted as follows: Yes, 719; no, 786. The women voted: Yes, 589; no, 237. The women's favorable majority of 352 swept the men's no vote of 67, and left a majority of 285 for the change in government. As a result of the vote, the primary election and election to be held on March 13 and April 17 respectively, will be for the purpose of selecting a mayor and four commissioners, instead of aldermen, as heretofore.

Former Mayor Freed by Court.

Sandusky, O.—Ex-mayor Robert A. Koegle has been freed in common pleas court on a charge of failure to perform his duty in criminal cases while acting as police judge by not filing transcripts as prescribed by law. The freeing of Koegle was wholly on a technicality, judge Williams holding that the president of the city commission is not a ministerial officer under the meaning of the statute under which the indictment was brought. For the purpose of record to aid prosecutor Flynn in an attempt to persuade the supreme court to pass on the question of whether the mayor is a judicial and not a ministerial officer, judge Williams permitted, with the consent of defendant's counsel, a copy of the city charter and other papers to be admitted as evidence. In his ruling judge Williams read from the city charter the duties of the president of the city commission and held that these duties were clearly executive and judicial and not ministerial in the broad scope of the meaning of that term, which is, according to decisions of high courts, of one who has no power to decide what is to be accomplished and who obeys a superior. The only precedent case cited by Judge Williams was one in which a supreme court held a mayor was a judicial officer. Having failed to provide for the election of a city judge, the council of Indianapolis appointed the mayor to act as such. Later the mayor resigned to accept the nomination for sheriff and was elected. The election was contested under a statute which provides that a judicial officer shall not accept election to another office not a judicial one during the term for which he was elected, and the supreme court held the mayor was a judicial officer and his election was declared illegal.

To Segregate Utility Finances.

Eufaula, Ala.—In order to determine whether it is operating at a profit or a loss, the finances of the water and light department of the city, which has charge of the municipal waterworks, gas plant and electric light plant, have been separated from those of the general government by the city council. Hereafter, it will have its own set of books and receive and pay out its own money without going through the city treasury, as has been the case heretofore. In addition to this, the city government will pay the department for street lights, water service and any other service for which it would have to pay a private corporation.

Suggest Tax Reforms for Connecticut.

Hartford, Conn.—In its report recently presented to the legislature the special commission, appointed by Governor Holcomb in 1915 to consider taxation, codify the laws relating to taxation and report the result of its investigations and recommendations, and consisting of former governor Simeon E. Baldwin, Frank H. Stadmueller and Guy P. Miller, makes a number of recommendations for changes in the laws, with accompanying bills proposed for enactment. The report states that the commission has given much time to consideration of possible changes in the state tax laws, such as an extension of the income tax to individuals and the introduction of an occupiers' habitation tax and taxation of merchants and manufacturers by towns according to their gains instead of their property, but has come to the conclusion—particularly in view of the large amount of satisfactory legislation relating to taxes enacted in 1915, except in a few instances—to confine recommendation to such as aim to secure proper administration and enforcement of present laws. "As a general proposition it is safe to say," the report declares, "that our system of tax laws is in principle well adapted to the nature of our people and their occupations in life. They need some amendments to make them work more smoothly and more efficiently, but with such amendments we think results sufficiently satisfactory should be obtained." Guy P. Miller of the commission dissents from the other members on recommendations for changes in the law relating to taxes on intangible property and recommends the development of the income tax law to include partnerships and individuals and that for the development of the law along these lines a special commission be appointed to report to the next legislature. In case his recommendations are not adopted, however, he concurs in the general conclusions of the commission. The commission makes these recommendations for changes:

That the State Board of Equalization's powers be extended so that it will have power to employ experts where necessary to go into any town of the state with large powers of investigation of the lists of individuals and those of manufacturing, mercantile and other business establishments.

An act requiring town assessors to revalue all real estate every five years.

An act relinquishing to the towns all interest of the state in fees for liquor licenses.

An act exempting all state and town bonds and notes as well as those of municipal corporations from taxation.

That the state tax be reduced to $1,000,000 a year from the towns and a law automatically to levy that sum annually on the several towns of the state.

An act exempting testimentary gifts to charitable corporations of the state from the succession taxes.

An act to include watches and jewelry kept solely for personal use in the list of property exempt among the articles of household use. Also increase of exempt household furniture from $500 to $750; cash not exceeding $500 instead of $100; musical instruments not exceeding $200 instead of $50; and private libraries and books not exceeding $500 instead of $200.

Such a change in the law as will allow payment on intangible securities which the owner represents to be worth less than par, to be calculated at $4 on each $1,000 of their true value and that it should be allowed as to notes of other indebtedness, the principal of which has been partly discharged, the valuation to be made in the first instance by the oath of the owner, but subject to change, on due notice by the tax commissioner, from whose action an appeal will lie in the Superior court.

An act limiting the time for presenting claims for back taxes against estates of deceased persons.

An act requiring the state secretary to notify town assessors of motor vehicles owned in the several towns of the state as registered with him.

That the present tax of one half of one per cent. on the

market value of the shares of stock, of stock insurance companies and the present method of taxing mutual insurance companies on the basis of their gross assets be repealed and enactment of a law providing for a franchise tax on the basis of the recommendations of the special commission of 1913, except that instead of a sliding scale dropping one-eighth of a cent from four to three per cent the tax be a flat three per cent rate annually.

The report declares that: "A large balance in the state treasury, generally speaking, is undesirable, because it tends to promote appropriations that are unnecessary as respects both their purposes and their amount. As the balance of some $7,000,000 in the state treasury, at the opening of the session of this assembly, indicates that our present laws produce a larger revenue than is needed in ordinary course, it would seem to the commission that these laws should receive some modification." By the changes, which it recommends, the commission estimates that the state would lose in round numbers $2,477,400 and gain $787,100, a net loss of $1,690,300, which subtracted from the revenue of the state for 1915-1916 of $11,390,900 would leave revenues for 1917-1918 of $9,700,600. The towns and municipal corporations would lose $74,270 and would gain from the state in the liquor license fees the sum of $440,000, a net gain of $365,730.

TRAFFIC AND TRANSPORTATION

Many Hurt by Overturned Car.

Toledo, O.—Thirty-two passengers were badly injured when a street car containing about 85 turned over on its side. The motorman was arrested, charged with exceeding the 12 mile-an-hour speed limit by going at a 30-mile rate. The passengers say that the car was being driven at high speed, not even making the safety stops, and when the car struck an open switch it went half way around the curve and crashed over. A nearby fire company rescued the injured by means of ladders through the upper windows of the car. Five ambulances and three police cars responded to the alarm for the accident.

One Killed in Head-on Collision.

Lawrenceville, N. J.—One motorman was killed, the other badly injured and a number of passengers hurt when two interurban trolley cars on the Princeton division of the Trenton & Mercer County Traction Corporation crashed headlong into each other. County detectives blame the night collision on the signal system, which gave both cars the right of way at the same time.

Car Crashes Into Celebrating Crowd.

New York, N. Y.—While a crowd of between 3,000 and 4,000 people were massed at the Williamsburg bridge plaza to watch the Washington's Birthday celebration a street car going over the bridge left the tracks and crashed into the crowd, killing a boy and injuring about 15 other persons, including women and children. Investigation by police, railway officials and public service commission engineers disclosed the fact that the accident was caused by an imperfect junction in the rails, the failure of the safety brake to work and slippery rails. There is a gap in the underground power transmission at the point of the accident which necessitates high power operation to go over. That not more were killed was remarkable.

New Jitney Ordinance Again Opposed.

Dallas, Tex.—The new ordinance to require all jitneys to operate under bond of $2,500 and to prohibit passengers from riding on doors of motor busses is now in effect, passed after about five hours of discussion by attorneys representing the Jitney Association and the city of Dallas. The attorneys representing the jitney organization said, after the commission announced that it had agreed to make the bond $2,500 and prohibit door riding, that the jitney business in Dallas would be killed immediately upon the ordinance going into effect. It also was announced that rent cars will be placed under the same restrictions and regulations as the jitney cars. Following are some of the changes from the old jitney ordinance:

The provision for six hours' continuous service changed so as to require motor buses to be operated four hours in the morning and four hours in the afternoon. Operations at any other time to be permitted in accordance with the provisions of the ordinance.

The Board of Commissioners may grant the application for a route other than that for which the application is made if in their opinion, by reason of traffic conditions, operation over the route designated would be dangerous to public safety or if public convenience would be better served thereby, and for such reason may at any time after the granting of the application change the route to another route for the same reasons.

The age limit of 18 years does not appear in the new ordinance, but the question of the age and physical fitness of the applicant in each particular case is to be determined by the Board of Commissioners.

The provision requiring sixty days' residence in the city was eliminated.

The operation of the motor bus as a vehicle for hire, except on the route designated, is prohibited.

No permit required from the automobile inspector in case of a change in drivers, but each driver required to wear his badge on the left breast of his outer garment.

The word "bus" and the motor license number thereof are to be painted on the rear of the body thereof in letters not less than five inches in height, and the termini to be painted with lead and oil on the wind shield. This in order that the automobile inspector may properly regulate the operation of motor buses by seeing that each motor bus is on the route designated, and in order that any such motor bus may be recognized as such in case operation off of such route is attempted.

Prohibiting riding on doors.

Existing licenses may be surrendered, the unearned portion applied to the cost of a new license, or if no new license is desired, to be refunded to the holder.

Prohibiting the transfer of motor bus license from one car to another car.

LEGAL NOTES

A Summary and Notes of Recent Decisions—Rulings of Interest to Municipalities

Paving—Choice of Material—Award of Contracts.

(Neb.) Where city charter provided that property owners might designate material for paving by petition within 20 days from advertisement of bids, on filing of petition, council could contract for improvements without awaiting expiration of 20 days.—State v. Dahlman, 160 N. W., 117.

Precautions Before Epidemic.

(N. Y. Sup.) The health authorities of a city need not wait till an epidemic of typhoid has broken out before taking precautions against it, but may make all reasonable efforts to protect the public health before the emergency arises.—People ex rel. Schulz v. Hamilton, 161 N. Y. S., 425.

Garage in Residence Section—Prohibition—Validity.

(Del. Ch.) An ordinance prohibiting erection of a public garage in the residence portion of the city without the consent of the owners of adjoining lands held invalid, as an unreasonable and unwarranted delegation of the police power.—Dangel v. Williams, 99 A, 84.

Regulation of "Drumming" for Hotels.

(Ark.) Kirby's Dig., § 5438, authorizing municipalities to regulate drumming for hotels, etc., for the patronage of "persons who arrive on trains or otherwise," authorizes a municipal ordinance, forbidding the proprietor of a hotel, etc., to drum more than 50 feet away from his premises.—Baird v. Bray, 189 S. W., 657.

Care of Streets and Sidewalks—Negligence—Liability.

(Ky.) A municipality, failing to exercise ordinary care to keep and maintain streets and sidewalks, taken over by it, in reasonably safe condition for the travel for which they are intended, is liable to one damaged thereby.—Tudor v. City of Louisville, 189 S. W., 456.

Ordinance—Reasonableness.

(Del. Ch.) The unreasonableness of an ordinance may appear on its face independent of its actual operation, and reasonable doubts are to be resolved in favor of ordinance.—Dangel v. Williams, 99 A., 84.

Contracts—Subsequent Agreements.

(Tex. Civ. App.) Contracts for municipal improvements were not abrogated by a subsequent agreement of the city to deliver in advance the warrants for the work on the execution of an indemnity bond.—Graves v. M. Griffin O'Neil & Sons, 189 S. W., 778.

NEWS OF THE SOCIETIES

Calendar of Meetings.

March 5, 6.—NATIONAL PAVING BRICK MANUFACTURERS ASSOCIATION. Board of Directors meeting, McAlpin Hotel, New York City. Secretary, Will P. Blair, 830 Engineers' Building, Cleveland, O.

March 13.—MAYORS ASSOCIATION OF THE SOUTH ATLANTIC AND GULF STATES. Convention, Savannah, Ga. Secretary, Ernest Metcalf, Jacksonville, Fla.

March 13-14.—AMERICAN WATER WORKS ASSOCIATION, ILLINOIS SECTION. Annual meeting, Urbana, Ill. Secretary, Dr. Edward Bartow, Urbana, Ill.

March 14.—VERMONT SOCIETY OF ENGINEERS. Meeting, Hotel Vermont, Burlington, Vt. Secretary, Geo. A. Reed, Montpelier, Vt.

March 15-16.—WISCONSIN ELECTRICAL ASSOCIATION. Convention, Milwaukee, Wis. Secretary, George Allison, First National Bank Building, Milwaukee.

April 17-19.—TRI-STATE WATER AND LIGHT ASSOCIATION OF THE CAROLINAS AND GEORGIA. Seventh annual convention, Macon, Ga. Secretary-treasurer, W. F. Stieglitz, Columbia, S. C.

April 18.—AMERICAN WATER WORKS ASSOCIATION, FOUR STATE SECTION. Annual meeting, Philadelphia, Pa. Secretary, Charles R. Wood, 400 Chestnut Street, Philadelphia, Pa.

April 18-22.—NATIONAL CONFERENCE ON COMMUNITY CENTERS. Annual conference, Chicago, Ill. Secretary, John Collier, 70 Fifth Ave., New York.

May 8-10.—NATIONAL FIRE PROTECTION ASSOCIATION. Annual meeting, Washington, D. C. Secretary-treasurer, Franklin H. Wentworth, 87 Milk Street, Boston, Mass.

June 4-5.—AMERICAN ACADEMY OF MEDICINE. Annual meeting, New York City. Secretary, Dr. Thomas W. Grayson, 1101 Westinghouse Building, Pittsburgh, Pa.

June 4-8.—AMERICAN MEDICAL ASSOCIATION. Annual meeting, New York City. Secretary, Frederick R. Green, 535 North Dearborn Street, Chicago, Ill.

June 11.—NEW YORK STATE CONFERENCE OF MAYORS AND OTHER CITY OFFICIALS. Annual conference, Buffalo, N. Y. Secretary, W. P. Capes, 25 Washington Ave., Albany, N. Y.

June 26-30.—AMERICAN SOCIETY FOR TESTING MATERIALS. Annual meeting, Atlantic City, N. J.

Nov. 12-16.—AMERICAN SOCIETY OF MUNICIPAL IMPROVEMENTS. Annual convention, New Orleans, La. Secretary, Charles C. Brown, 469 Transportation Building, Chicago, Ill.

American Waterworks Association—New York Section.

This section held its regular meeting at the Hotel Astor, New York, on Wednesday, February 21. Two papers were read, one by F. N. Speller, of the National Tube Company of Pittsburgh, on the "Corrosion of Service Pipes," followed by moving pictures showing the manufacture of National welded steel pipe from the ore to the finished product; and the other by Harry Y. Carson, of the Central Foundry Company, entitled "The Rusting of Pipe in Service." At this meeting a successor was elected to Robert E. Milligan, as governor of the section for a five-year term, and Secretary Bush made a brief report.

The meeting opened with a few words by Leonard Metcalf, the president of the American Waterworks Association, which was followed by the secretary's report, in which he stated that the membership had been increased by four during the year; that the attendance at the meetings had increased from 66 to 99, the attendance at this meeting; and that the expenses for the year had been a little less than $100, which is about one-fourth of the amount allowed by the parent organization for the expense of the section. George A. Johnson was elected to succeed Mr. Milligan.

Mr. Speller in his paper stated that recent experiments with hot water passing through a line of iron and steel pipes, alternating showed that there was very little difference in the rate of corrosion of the two and that steel possessed the advantage of greater uniformity in composition than iron. Mr. Carson, after stating that it was generally recognized that cast iron did not rust nearly as much as either steel or wrought iron, gave an explanation for this in the structures of the material, of the rolled steel or iron being laminated parallel to the surface, which lamination had a tendency to flake off over larger or smaller areas; while cast iron, having no particular grain or lamination, did not have this tendency; and that the interior of the iron was protected from rusting by the action which took place upon its surface; all of which he illustrated by micro-photographs on the screen.

Montana Municipal League.

Plans to provide home rule to all cities of Montana are included in a bill to be presented in the state senate, which allows towns and cities to govern themselves as they see fit upon voting for a charter as allowed by the statute, for which a commission will be appointed by judges of the district court, to draft the charter.

The idea was endorsed by the meeting of mayors and city officials of the Montana Municipal League at their recent gathering in Helena.

The provisions of the law are optional with the cities and towns of Montana, and any city or town may frame and adopt a charter for its own local self-government and home rule.

Upon presentation to the city or town council of a petition requesting the selection of a charter commission, signed by at least 10 per cent. of the number of voters of such place, as shown by the total number of votes cast for mayor at the last preceding general election, such council may request the judges of the district court in which the city or town is situated to appoint a charter commission composed of seven members, with terms of two years, the members of such commission to receive no compensation, but the commission to employ an attorney and a clerk to assist in framing the charter.

Within six months after such election the charter commission shall deliver a draft of the proposed charter, signed by at least a majority of its members. Such draft shall provide a mayor and council composed of at least three members, to be elected by the people, one of whom shall be designated as mayor.

No charter shall permit any city or town to become indebted above the limit prescribed in the constitution of Montana, and enactments of the legislative assembly.

After drafting of a charter, it shall be submitted to the voters, and shall be considered adopted if favored by four sevenths of the electors.

Any city or town which shall have operated for more than two years under the provisions of the act may abandon such organization and accept the provisions of the general law of the state then applicable to cities and towns of its population. Upon petition of not less than 25 per cent. of the electors of such city or town, a special election shall be called to determine whether the home rule plan shall be abandoned.

New Jersey Association of Local Assessors.

The New Jersey Association of Local Assessors at their annual meeting held at Trenton February 6 decided to hold a mid-summer meeting in Atlantic City this year. A committee was appointed to select the dates and place of meeting.

About 200 assessors from all parts of the State attended the gathering.

The assessors unanimously approved of Assembly Bill No. 30, placing all of the assessors of the state under the tenure of office act. The committee having the bill in charge gave the assessors a hearing on it and subsequently reported favorably on it. There is every prospect that the measure will pass.

Officials were elected as follows: George F. Brensinger, director of revenue and finance, Jersey City, president; V. E. Edwards, Bridgeton; J. A. Wales, Cape May; A. M. Ruffu, Atlantic City, and G. R. Slicker, Fort Murray, vice-presidents; Louis Lipschultz, Passaic, treasurer, and Robert R. Volk, president of the local board of assessors, secretary.

An executive committee of two persons from each county in the state will be named by the president.

Texas County Auditors.

Charles E. Gross, of Dallas, and Joe M. Fugitt, of Greenville, were elected temporary chairman and secretary, respectively, at a preliminary organization meeting of Texas County auditors, held Feb. 8 at Dallas. The organization is planned for the discussion between members of uniform methods and improvements in accounting and auditing systems.

A committee composed of the following persons was appointed to draft a constitution and by-laws for the new organization: Charles E. Gross, Dallas;

R. J. Berry, Beaumont; C. T. Spalding, Waxahachie, and G. W. Fox, McKinney.

Waco was selected as the city in which shall be held the permanent organization meeting, subject to the call of the chairman and secretary of the temporary organization.

Road Builders of East Tennessee.

The annual conference of Road Builders for East Tennessee was held at the University of Tennessee, Knoxville, February 1 and 2. The program opened with an address of welcome by Dr. Brown Ryres, president of the University of Tennessee. This was followed by an address by A. M. Nelson, state highway engineer of Tennessee, on "Maintenance by Patrol System," and subsequent discussion of the topic was participated in by Judge Clabough, of Sevier County; W. H. Crox, member of the state highway commission; Nat Nave, of Carter County, and J. H. Hoskins, engineer of Rhea County.

The afternoon program of the first day began at 2 o'clock with address on "Economic Highways," by A. R. Losh, engineer economist, office of public roads, Washington, D. C. Subsequently there was a discussion of the subject, participated in by L. B. Bryan, engineer of Hamilton county; C. E. Coile, engineer of Greene county, and D. W. Harmon, engineer of Blount county. At 3.30 o'clock there was an address on "Economic Location of Highways" by Major J. A. Reagan, division engineer of the department of highways, and discussion by R. O. Gallaher, engineer of Knox county; W. I. Smith, engineer of Fentress county, and E. J. Smith, engineer of Meigs county.

The night session opened at 7.30 with an address on "A Uniform Road Law for Tennessee" by J. J. Murray, secretary of the department of highways. The address was followed by a general discussion, led by Judge Geo. P. Lindsey, of Rockwood, and W. C. Rinearson, of Harriman.

The second day's session began with an address on "Cooperation of County and State in Road Building and Maintenance," by A. M. Nelson, state highway engineer. The subsequent discussion was assigned to R. H. Crox, chairman of the board of public road commissioners, Chattanooga, and Joe McDonald, engineer of Union county. At 10 o'clock there was an address on "Use and Abuse of Bituminous Material in Road Building and Maintenance" by R. C. Fergus, division engineer of the department of highways, and discussion by S. G. Walker, engineer of Shelby county, and Thos. E. Morris, of Robertson county. "Methods of Accounting to Secure State Co-operation in Road Building" was the topic selected by J. J. Murray, secretary of the department of highways.

The closing session started with an address on "Conditions Whereby Federal Aid Can Be Secured by the States," by A. R. Losh, engineer economist, government office of public roads, Washington, D. C., the subsequent discussion being led by J. J. Murray. Following this there was an address on "Reinforced Concrete Bridges," by N. W. Dougherty, professor of civil engineering at the University of Tennessee. The final address was on "Making Good Concrete," by Prof. J. A. Switzer, professor by hydraulic and sanitary engineering at the University of Tennessee.

New Jersey Electrical Contractors' Association.

With a banquet at which mayor Donnelly was the speaker, the annual convention of the Electrical Contractors' Association of the state of New Jersey was brought to an end January 20. Close to 200 delegates from all parts of the state were in attendance. There were three meetings held, the first being a business session; an open meeting for electrical men was held in the afternoon and the convention concluded with a banquet.

Election of officers for the ensuing year and the appointment of committees was the most important business transacted. The officers elected were: Charles R. Newman, of Passaic, president; E. P. Strang, of Camden, vice-president; Paul H. Jaehnig, of Newark, treasurer; Jewell VanDyke, of Asbury Park, secretary.

(*Continued on page 323.*)

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

Osborne, Kans., is making a number of PAVING IMPROVEMENTS. Plans were made by Black & Veatch, Interstate building, Kansas City, Mo.

Malmo, Neb., is to construct an ELECTRIC LIGHT PLANT. The engineer for the project is Edw. F. Schurig, Omaha, Neb.

A WATER-WORKS SYSTEM, including pumps, mains and tower, is to be constructed by Sumrall, Miss., from plans prepared by Xavier A. Kramer, Magnolia, Miss.

Dell Rapids, S. D., is to construct an ELECTRIC LIGHT AND POWER PLANT, to cost $35,000. Plans are in progress by the Electric Development Co., Omaha, Neb.

A GARBAGE DISPOSAL PLANT is to be constructed by Whiting, Ind. Plans were prepared by the Boiler Efficiency Engineering Company, 608 South Dearborn street, Chicago, Ill.

The village of New London, O., is to construct a WATER WORKS SYSTEM, including reservoir, mains and pumping station. The engineers are Burgess & Long, 827 Columbus Savings and Trust Building, Columbus, O.

SEWERAGE SYSTEMS and treatment plants are to be constructed by Clear Lake, S. D., and by Wessington Springs, S. D. Plans for both these improvements have been completed by the Dakota Engineering Company, 309 Western National Bank building, Mitchell, S. D.

A SEWAGE DISPOSAL PLANT and intercepting sewers are planned for Leetonia, O. F. C. Bradbury, Columbus, O., is the engineer for the work.

Ft. Atkinson, Wis., is to construct a reinforced concrete BRIDGE. Plans have been completed by E. B. Parsons, Jefferson, Wis.

A SEWERAGE SYSTEM, to cost $150,000, is being planned for West Chicago, Ill. The engineers for the work are Marr, Green & Co., 17 North La Salle street, Chicago, Ill.

PAVING IMPROVEMENTS to cost $100,000 are being planned for Hays, Kans. The engineers for the work are E. T. Archer & Co., 514 New England building, Kansas City, Mo.

Plans for a sanitary SEWER SYSTEM for Ferndale borough, Pa., have been completed by L. R. Owen, Otto building, Johnstown, Pa., who recently prepared similar plans for Windber, Pa

Pontiac, Mich., is planning extensive improvements to its SEWERAGE SYSTEM. The consulting engineer, Clarence W. Hubbell, 2338 Penobscot Building, Detroit, Mich., who was retained last fall, has made a preliminary report.

A WATER WORKS SYSTEM, including pumping and distribution equipment, is to be constructed by the village of Dundee, Mich. The engineer for the improvement is George Champe, 610 Nasby building, Toledo, O.

PERSONALS

Gayner, K. C., of Sioux City, Ia., has been elected president of the Iowa State Engineers' Society.

Meyer, H. R. J., has been appointed acting city engineer of Havre, Mont.

Morton, William S., has resigned his position as engineer in charge of work in Arkansas for the Missouri Pacific Railway to accept a position in the offices of Henry Exall Elrod, consulting engineer, of Dallas, Texas. Mr. Morton is a graduate of the University of North Carolina, of the Class of 1904. For a number of years he confined his practice to municipal engineering, and during that period completed various civic improvements in Virginia and the Carolinas, later entering the employ of the United States Government as supervising engineer in charge of canal and lock construction. He will devote his attention principally to paving and sewer matters.

Podmore, J. Cyrus, a civil engineer of Troy, N. Y., and connected with the state barge canal staff, died February 1.

NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

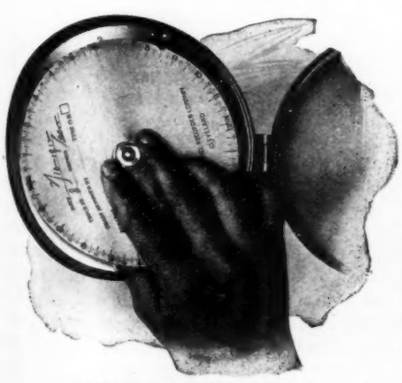
"SERVIS RECORDER."

For Registering Working Time of Trucks, Wagons and Other Equipment.

Increasing municipal efficiency must necessitate the accurate recording not only of the obvious expenditure of the city's money, but also of the time of the many municipal employes and equipments. It is ridiculously poor economy to make several bookkeeping entries of the purchase of a few small bolts and to leave unrecorded and unconsidered the idle time of a fleet of garbage collection trucks. Every detail significant in a policy of strict economy and efficiency should be a subject for record, careful study and improvement and the work of vehicles and of machinery in construction is rapidly becoming more and more important in the progressive municipality.

These considerations apply with equal force to the service of contractors. Very often now it is the hitherto unrecognized economy in operation that decides whether there shall be profit or loss on a job. And there can be no real economy in operation without accurate knowledge.

The Servis Recorder was designed for just such a function. It is a device for registering automatically and accurately the productive and non-productive time of either horse-drawn or power-driven vehicles, locomotives and such construction equipment as steam-shovels and dredges. It gives a daily chart (24 hours) showing the time (how long and when) of running the vehicle or equipment and the idle periods. From this chart the executive in charge of operations may determine such important data as the times of beginning and stopping work, the hours of actual service, loading and unloading delays, punctuality and reliability of drivers, stops and movements, working efficiency, improper use of vehicle, etc.



INSERTING CHART.

The instrument is entirely self-contained and designed with the utmost simplicity. It does not connect in any way with any gear or other running part of engine or driving mechanism of vehicle or equipment. This naturally makes for reliability of operation. Three screws or bolts are used to fasten a steel protecting case to the body of the vehicle. The recorder is hung in two slots within this case and fastened by a single bolt to the back of the protecting case. The instrument is attached or detached in a minute, but is so designed that it is absolutely necessary to have access to its interior, which is under lock and key, in order to remove it. As an additional safeguard against interference with the record by unauthorized persons, the margin of the record chart is automatically punched showing the time at which the case is opened and closed. The instrument is thus tamper-proof.

The principle of operation of the device is the use of the oscillation or side-sway of the vehicle or equipment through a pendulum in it. This pendulum is not affected by vibration, such as that of an auto engine—it is of such a period as to be affected only by the side-sway of the vehicle, always present when the machine is running, no matter how smooth the road is. In the case of dredge or steam shovel the pendulum is of such a period that it records only the motion peculiar to the

OUTER CASE.

actual working of the machine. The recorder may be fastened in any convenient place on the vehicle, facing either front or back, not necessarily vertically. A special heavy eight-day jeweled clock movement is the timing mechanism, so that winding once a week is all the adjustment necessary, except the changing of the record sheets. The recording device is a sapphire-pointed stylus connected to the pendulum, which is hung on a sturdy bronze bearing. The recorder is about eight inches in diameter.

No oiling or other attention is necessary, as the whole equipment is constructed for simplicity of handling and for hard usage. The recorder has been used, for instance, on a number of garbage-wagons, which were not housed during the night, for almost a year without one case of repair or adjustment from any cause.

The field of application in municipal service is very wide. The work of fire and police apparatus, ambulances, garbage-wagons, water, light and street department trucks, street sprinklers, flushers and oilers and similar equipment could all be made more efficient by the use of a recording device. Hauling for all kinds of construction work needs particularly such accurate records. Public service corporations and contractors should find the device similarly valuable.

The recorder is in service on the refuse collection trucks in Boston, Mass., where increased efficiency has been marked. It is used also, for instance, on the sprinklers and flushers in the service of Worcester, Mass., recently described in Municipal Journal. Here Street Commissioner Albert J. Rhodes has found them particularly effective.

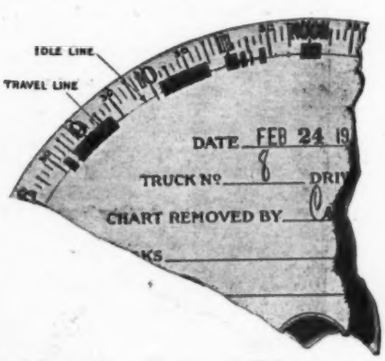
The accompanying illustrations show the outside case, the inserting of the chart and a section of the record.

The recorder is made by the Service Recorder Company, Cleveland, O.

ROTATOR HAMMER DRILLS.

Sullivan Equipment for Rock Drilling in Road Work.

The various uses of portable air compressors in construction work have been described in these pages a number of times. One use, which has been widely prevalent, and which has been mentioned, is for rock-drilling in road work and similar construction jobs. A favorite combination is the Sullivan portable air compressor and the Sulli-



PART OF CHART RECORD.

van "Rotator" hammer drill. The use of this equipment has proved particularly effective in rock-handling in road construction.

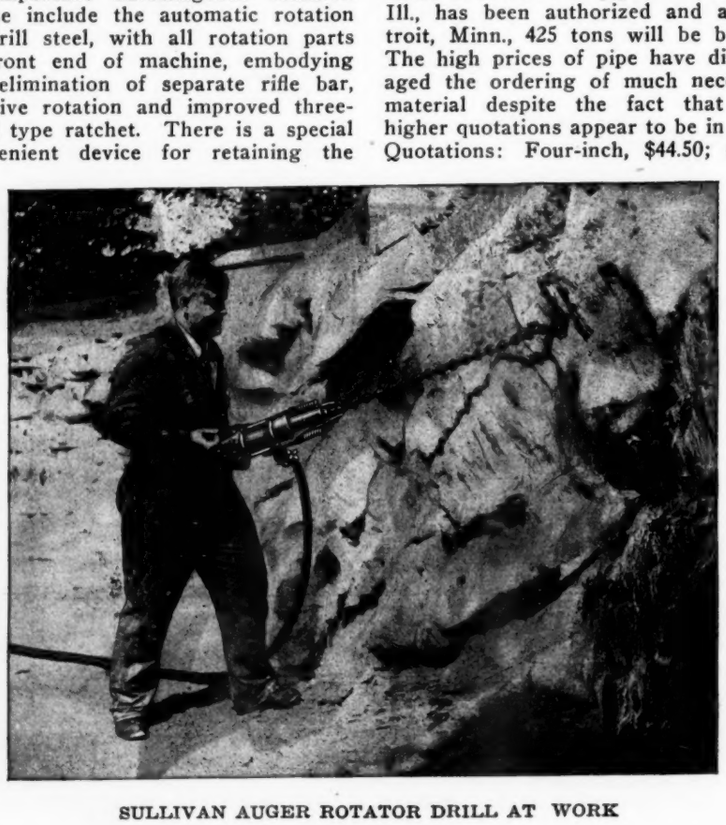
The "DP-33" rotator is a standard hammer drill, with automatic steel rotation, suitable for the general run of rock-drilling service. The "DR-33" angle rotator is intended for shale and other formations too soft or too broken to be handled successfully by the standard drill. The Sullivan rotator is an all-steel, hand-fed, one-man hammer drill, weighing 40 pounds. It is capable of drilling holes from 8 to 12 feet in depth, to take 1¼-inch powder. When operated by hand it is suitable for all classes of down hole drilling in ordinary practice, and when provided with one or another of its three styles of mounting, the rotator may be used to all the usual varieties of work.

The "DP-33" drill uses hollow steel, and is made in several styles, including the "solid piston rotator," "hollow piston rotator," "air tube rotator" and "water tube rotator"—the first three being generally used for down hole drilling. The hollow piston drill employs a jet of live air, discharged from the rear end of the cyclinder through a hole bored in the piston, and thence through the drill steel, to clean the hole of its cuttings. A similar but somewhat more effective result is obtained with the air-tube rotator, in which a tube runs through the hollow piston and into the top of the drill steel, a by-pass throttle conducting a jet of live air directly into the tube.

For these drills is claimed a number of important advantageous features. These include the automatic rotation of drill steel, with all rotation parts in front end of machine, embodying the elimination of separate rifle bar, positive rotation and improved three-pawl type ratchet. There is a special convenient device for retaining the drill steel. Other features are: the Sullivan differential valve motion; valve chest and cyc'inder in one integral piece; automatic, differential pressure lubricator; removable, dust-tight chuck bushing; air jet and air tube attachments for cleaning the drill hole of its cuttings. Unusual drilling speed and powerful blow are claimed. The cushioned piston reduces vibration, fatigue of the runner and wear and tear on the tool. The outfit is designed for simplicity and accessibility. There are no threaded connections. All parts are held together by heavy side rods, and the tool may be taken to pieces, rendering all parts accessible, by loosening four bolts. All parts are of steel, properly heat-treated, and are interchangeable.

The low weight of the Sullivan rotator permits it to be used for drilling side or horizontal holes, or those directed upward, without excessive labor. An example of such use is shown in one of the accompanying illustrations. Here a Sullivan auger rotator is shown at work boring a side hole in a ledge on road work. The other illustration shows a Sullivan rotator, operated by a Sullivan gasoline engine-driven portable air compressor, removing rock on the Lincoln Highway at Glenwood Canyon, Colo.

The equipment described is made by the Sullivan Machinery Company, Peoples Gas building, Chicago, Ill.



SULLIVAN AUGER ROTATOR DRILL AT WORK

INDUSTRIAL NEWS

Cast Iron Pipe.—Chicago.—The purchase of 350 tons of pipe for Rockford, Ill., has been authorized and at Detroit, Minn., 425 tons will be bought. The high prices of pipe have discouraged the ordering of much necessary material despite the fact that even higher quotations appear to be in sight. Quotations: Four-inch, $44.50; 6-inch and larger, $41.50, with $1 extra for Class A. Birmingham.—The pipe market, while experiencing a lull in big new municipality business, owing to high prices, is sustained by scattering fill-in orders and past due contracts lapping over from busier times. Operations are still around capacity. Quotations: Four-inch, $39; 6-inch and upward, $36, with $1 added for special lengths. New York.—Among the few public lettings announced the most important are those of Syracuse, N. Y., Feb. 26, on 500 tons of 4 to 24-inch and the city of New York, also Feb. 26, on 295 tons of 8-inch for the borough of Brooklyn and 88 tons of 6 and 8-inch for the borough of Richmond. The big Rochester job will shortly be ready for proposals, as specifications are now being prepared. This will take about 10,000 tons of either cast-iron pipe or riveted steel pipe. The number of inquiries from private buyers is encouraging, indicating that more interest is being taken as spring approaches. Export inquiries are becoming so numerous that American manufacturers are confident of a much greater trade for foreign account if shipping room should become more readily available at something like reasonable rates. Prices are firm. Quotations: Six-inch, class B and heavier, $41.50; class A, $1 extra.

Lead.—But little lead is on the Atlantic seaboard, and 10.25 cents has been paid. Quotations: New York, 9.50 cents; St. Louis, 9.25 cents.

The Walter A. Zelnicker Supply Company, St. Louis, Mo., has purchased the Idaho Southern Railroad, which runs from Gooding to Jerome, Ida., and the Milner North Side Railroad, a short line extending from Milner to Oakley, Ida., comprising a total of about 50 miles. These railroads were built only a few years ago by Pittsburgh capital. It is understood that the purchasers will dismantle the roads and sell the rails and other equipment, which is practically new.

The Indiana Truck Corporation, Marion, Ind., has just published a handsome catalogue on the Indiana line of worm-driven motor trucks. Four models, 1 ton, 2 ton, 3½ ton and 5 ton, are completely described and illustrated, with full specifications. A great many pictures of trucks in service are an interesting feature of the new catalogue.

Motor Truck Opportunities in Spain.—Consul Ely E. Palmer reports that an exceptional opportunity now exists for the inauguration in Madrid of an energetic sales campaign for motor trucks. The municipal government has decreed that within two years the cobble pavements of the city shall be replaced by asphalt or other similar surface. The two-wheeled carts and heavy wagons must necessarily be replaced by a different type of heavy

vehicle, and it is probable that a wide-awake and well-connected representative would be able to dispose of a large number of motor trucks of various capacities. The duty on motor trucks is 40 pesetas ($7.72) each 220 pounds net weight, but it is important to note that a motor-truck chassis without the body pays a duty of 80 pesetas ($15.44) per 220 pounds gross weight if such weight be less than 2,200 pounds, and a duty of 100 pesetas ($19.30) per 220 pounds gross weight if such weight be more than 2,200 pounds. It would seem, therefore, that the shipment of the chassis alone would prove to be disadvantageous.

The H. W. Clark Company, Mattoon, Ill., has just published its "1917 Preparedness Bulletin," describing its meter boxes, covers, coupling yokes, water-meter testers, leak indicators, finders and locators, service boxes and valve boxes and housings, and iron collapsible forms and other waterworks equipment. The catalogue is completely illustrated.

Wallace & Tiernan Company, Inc., 137 Centre street, New York, N. Y., has just issued a new booklet entitled "Why." The problem of the sterilization of water supplies and the use of liquid chlorine for this purpose are discussed very interestingly and convincingly. Up to January, 1917, over 450 installations of Wallace & Tiernan chlorine apparatus had been made. The little book is excellently printed and should prove very effective in carrying its message of sanitation.

Portable Asphalt Mixing Plants.—Extension of bituminous road building into country districts, remote from permanent plants, has created the need for easily portable asphalt mixing plants. It is to meet this need that the **Iroquois Works** of **The Barber Asphalt Paving Company** has designed several types of plants, ranging from 800 square yards to much larger capacity. These plants and their operation are described in an illustrated bulletin (No. 2A), just issued by the Iroquois Works, Buffalo, N. Y.

NEWS OF THE SOCIETIES

(*Continued from page 287.*)

The board of directors comprises: Carl F. Adams, chairman; R. P. Ward, Dover; E. P. Strang, Camden; A. J. Long, Orange; Benjamin F. Sprague, Long Branch.

It was decided to hold the semi-annual convention in Asbury Park about the second week in July and the annual session in Newark, January 3, 1918.

New Jersey Sewage Works Association.

The first annual meeting of the New Jersey Sewage Works Association was held at the State House in Trenton on Friday, February 16th. There were forty municipalities represented and addresses were made by Governor Edge; Rudolph Hering, C. E.; Clyde Potts of the New Jersey State Department of Health and Chester G. Wigley, Chief of the Bureau of Engineering of the State Department of Health. Officers elected for the ensuing year were: President, John R. Downes, Plainfield; Vice Presidents, I. Z. Collings, Collingswood, Paul Molitor, Chatham, and Secretary-Treasurer, Frederick T. Parker, Atlantic City.

New England Association of Gas Engineers.

Officers were elected by the New England Association of Gas Engineers at its forty-seventh annual meeting, February 13, at the Copley-Plaza. Dr. J. F. Wing was elected president, and Nathaniel W. Gifford, of East Boston, secretary and treasurer.

The reports of the various officers showed the association to be in a satisfactory condition, with 169 active members. The first paper of the morning was on "A Few Gas Coals We Have Used," by Francis E. Drake of the Lynn Gas and Electric Light Company. Another paper was on "Gas Lighting," by J. C. D. Clark of Boston.

At the afternoon session, papers were read on "Auxiliary House Heating," by A. G. Spinney of Portland, Me., and "Some New Forms of Oxide," by A. H. Scott of Manchester, N. H. The concluding session was held February 15 with a paper by J. K. Quinn of Newport, R. I., on "Inclined Slots at Newport." This was followed by a question box.

UNITED STATES CIVIL SERVICE EXAMINATION.

Junior Engineer (Male).

March 21-22, 1917.

The United States Civil Service Commission announces an open competitive examination for junior engineer, for men only, on March 21 and 22, 1917. Vacancies occurring in the Water Resources Branch of the Geological Survey will be filled from this examination, unless it is found in the interest of the service to fill any vacancy by reinstatement, transfer or promotion. The entrance salaries will range from $1,080 to $1,200 a year and expenses when on field duty. Appointees from this examination will be eligible for promotion to the grades of assistant engineer and full engineer after they have demonstrated their fitness for such promotion to the satisfaction of the Department and the Commission. The salaries of assistant engineers range from $1,380 to $2,000 a year, and for engineer from $2,400 to $3,000 a year.

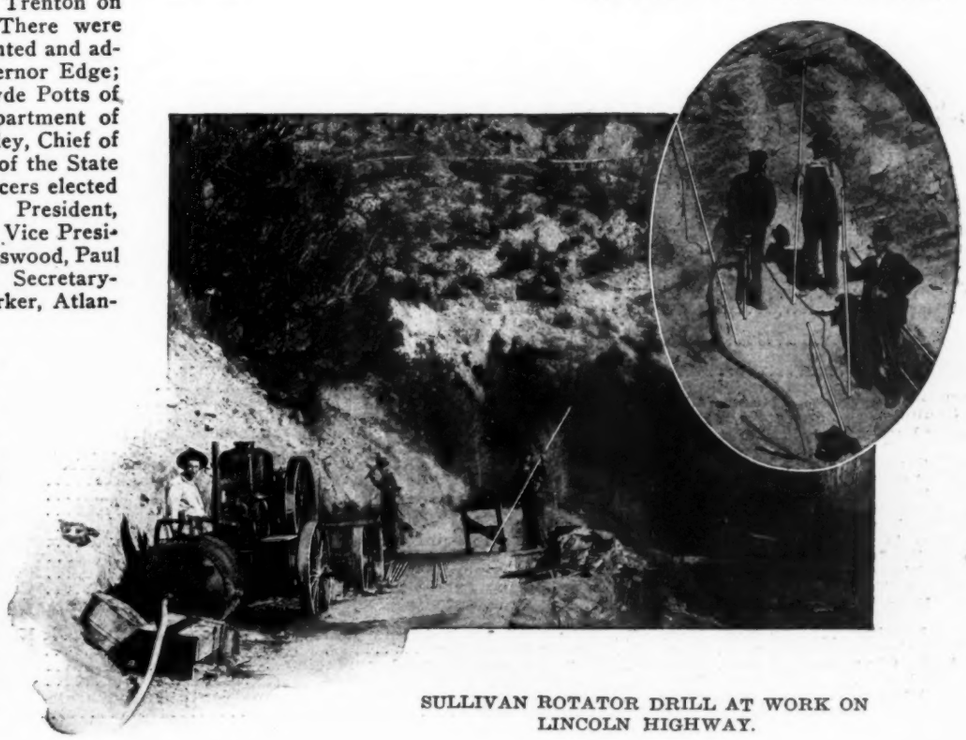
Competitors will be examined in the following subjects, which will have the relative weights indicated:

Subjects.	Weights.
1. Mathematics (algebra and geometry)	10
2. Plane surveying	15
3. Irrigation engineering	15
4. River hydraulics	25
5. Water-power engineering	20
6. Education and experience	15
Total	100

The applicant must show that he has graduated in engineering from a college or technical school of recognized standing, or that he is a senior student in such an institution and expects to graduate within six months from the date of this examination. The names of senior students will not be entered on the register until they have furnished evidence of graduation.

While this examination is similar in scope to that given for the position of hydraulic engineer, the character of the questions will be considerably more elementary.

Applicants should at once apply for Form 1312, stating the title of the examination desired, to the Civil Service Commission, Washington, D. C. The exact title of the examination as given at the head of this announcement should be stated in the application form.



SULLIVAN ROTATOR DRILL AT WORK ON LINCOLN HIGHWAY.

ADVANCE CONTRACT NEWS

ADVANCE INFORMATION BIDS ASKED FOR — **CONTRACTS AWARDED ITEMIZED PRICES**

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also correction of any errors discovered.

BIDS ASKED FOR

STATE	CITY	RECD UNTIL		NATURE OF WORK	ADDRESS INQUIRIES TO
				STREETS AND ROADS.	
Ind.,	Indianapolis	10 a.m., Mar.	2..	Constructing gravel roads	L. K. Fesler, Co. Aud.
Ind.,	Indianapolis	10 a.m., Mar.	2..	Constructing sidewalks and curbs	B. J. T. Jeup, City Engr.
Ind.,	Greenfield	10 a.m., Mar.	2..	3 miles gravel road construction	Charles Boone, Co. Aud.
Ky.,	Tompkinsville	Mar.	2..	12 miles county road	County Clerk
Wis.,	Oconomowoc	Mar.	2..	10,000 sq. yds. pavement; cost, $30,000	J. A. Stemper, City Engr.
N. C.,	Burlington	2 p.m., Mar.	2..	20,000 sq. yds. pavement, 20,000 ft. combined curb and gutter and 2,000 ft. railway strip pavement	E. C Derby, City Engr.
Minn.,	Minneapolis	3 p.m., Mar.	2..	30,000 sq. yds. bricks, 3,500 sq. yds. hillside blocks, 1,000 cu. yds. crushed granite or trap, 60,000 gals. flux, 800 tons refined asphalt, 800 tons asphaltic cement, 350,000 sq. yds. creosoted wood blocks, 2,000 tons paving pitch, 10,000 ft. granite curbing and 500 tons asphalt filler	K. E. Alexander, Pur. Agt.
Wis.,	Milwaukee	10:30 a.m., Mar.	2..	30,422 sq. yds. asphalt pavt. and brick gutter	F. G. Simmons, Comr. of P. W.
Wis.,	Milwaukee	11 a.m., Mar.	2..	26,300 sq. yds. concr. pavt. and 16,000 cu. yds. excavation; 22,100 sq. yds. concrete pavement	Co. Highway Comnrs., Pereles Bldg.
Ill.,	Chicago	11 a.m., Mar.	3..	Furnishing crushed limestone	Comnr. of Pub. Works.
N. Y.,	Buffalo	11 a.m., Mar.	3..	Paving and repaving 10 streets	A. W. Kreinheder, Comr. P. W.
Mich.,	Port Huron	5 p.m., Mar.	3..	4.25 miles concrete pavement	Co. Highway Engr.
Ind.,	Muncie	10 a.m., Mar.	3..	Construction of two gravel or macadam roads	F. M. Williams, Delaware Co. Aud.
Ind.,	Plymouth	1:30 p.m., Mar.	3..	Constructing six roads	O. H. Weber, Co. Aud.
O.,	Middletown	10 a.m., Mar.	3..	Furn. and applying 30,000 gals. asphaltic road oil	R. A. Kaser, Twp. Clk.
Ind.,	Rushville	2 p.m., Mar.	5..	13,950 ft. cement roadway	W. H. McMillin, Co. Aud.
Ind.,	Portland	10 a.m., Mar.	5..	Gravel and crushed stone roads	John Bonifas, Co. Aud.
Ind.,	Rockport	2 p.m., Mar.	5..	County road construction	J. Frank Stocking, Co. Aud.
Ind.,	Brazil	10:30 a.m., Mar.	5..	Stone and gravel road construction	W. O. Graeser, Co. Aud.
Ind.,	Jeffersonville	10 a.m., Mar.	5..	County road work	G. W. Stoner, Co. Aud.
Ind.,	Evansville	10 a.m., Mar.	5..	Constructing stone road	C. P. Beard, Co. Aud.
Ind.,	Shoals	noon, Mar.	5..	Township roadway	L. D. Haga, Co. Aud.
Ind.,	Greensburg	1 p.m., Mar.	5..	Constructing township road	J. C. Barbe, Co. Aud.
Cal.,	Yreka	Mar.	5..	Grading 3.75 miles of road	County Surveyor.
Kan.,	Columbus	noon, Mar.	5..	7,182 sq. yds. brick asphalt, asphaltic concrete or National pavement, and 4,000 ft. of curb and gutter	F. H. Hawkins, City Clerk.
N. J.,	Ventnor City	7.30 p.m., Mar.	5..	Laying 19,000 sq. yds. sheet asphalt and 1,800 sq. yds. brick gutters	W. I. Risley, Engr., Guarantee Trust Bldg., Atlantic City
Pa.,	Franklin	4 p.m., Mar.	5..	13,000 sq. yds. brick pavement	J. G. Crawford, City Clerk
Ariz.,	Douglas	Mar.	5..	140,000 sq. yds. pavement and 50,000 feet of curb	Fred Lindner, City Clerk
N. J.,	Newton	Mar.	5..	61,500 sq. yds. pavement construction	R. L. Slater, Clk. Bd. of Freeholders
Ind.,	Jasper	2 p.m., Mar.	5..	Constructing concrete road	Jacob H. Seng, County Aud.
Mo.,	St. Charles	7:30 p.m., Mar.	5..	6,720 sq. yds. 2-course concrete pavement with reinforcement; 2,240 cu. yds. grading; 480 lin. ft. combined granitoid curb and gutter	Carr Edwards, City Engr.
N. D.,	Wahpeton	8 p.m., Mar.	5..	Curbing and paving with hard surface pavement	S. H. Murray, City Aud.
Ind.,	Indianapolis	10 a.m., Mar.	5..	Paving alleys	B. J. T. Jeup, City Engr.
O.,	Columbus	noon, Mar.	5..	Furn. 200 tons refined asph.; 9,000 gals. residium; 20,000 gals. cold bit. material; 30,000 gals. hot bit. material; 5,000 gals. cold patch bit. material; 500 tons coal tar pitch filler; 1,500 tons lake sand; 1,500 cu. yds. bank or river sand; 5,000 tons macadam; 2,200 tons dust or screens; 1,000 cu. yds. crushed slag and 900 bbls. Portland cement	G. A. Borden, Pres. Bd. of Pur.
Wash.,	Seattle	10 a.m., Mar.	5..	Constructing Mercer Island Road	County Engineer.
Minn.,	St. Paul	10:30 a.m., Mar.	5..	36 cars of rd. oil for D. P. W.; 60,000 gals. for Pk. Dept	H. W. Austin, Pur. Agt.
Ind.,	Paoli	2 p.m., Mar.	5..	Gravel or macadam roads	P. M. Stephenson, Aud.
Ind.,	Franklin	2 p.m., Mar.	5..	Constructing five gravel roads	J. C. Gregg, Co. Aud.
Ind.,	Cannelton	noon, Mar.	5..	Constructing macadam roads	M. C. Conway, Co. Aud.
Ill.,	Princeton	Mar.	5..	41,725 sq. yds. brick pavement and 34,260 ft. combined curb and gutter	Board of Local Imprvts.
Fla.,	Bushnell	Mar.	5..	645,000 ft. roadway construction, bridges, etc.	W. M. Francisco, Engineer, Zephyr Hills, Fla.
S. D.,	Mitchell	Mar.	5..	18,000 sq. yds. concrete, wood or bit. concr. and 8,000 ft. concrete curb	S. H. Smith, City Engr.
Pa.,	Scranton	11 a.m., Mar.	5..	600 tons asphaltic cement	Bur. of Engineering.
Mich.,	Sault Ste. Marie	4 p.m., Mar.	5..	Repaving with wood block on bridges	Board of Public Works
Idaho,	Lewiston	10 a.m., Mar.	5..	Furnishing road material and machinery and iron culverts	County Commissioners
Wash.,	Coupeville	2 p.m., Mar.	5..	2.53 miles permanent highway	R. H. Gillespie, Co. Aud.
Wash.,	Asotin	Mar.	5..	Bridge over Grande Ronde River	J. Swan, Co. Engr.
Wash.,	Pasco	Mar.	5..	Two roads; cost, $17,000	J. W. Hepner, Co. Engr.
R. I.,	Providence	2:15 p.m., Mar.	5..	Furnishing granite paving block	Comr. of Pub. Wks.
N. J.,	Hackensack	8 p.m., Mar.	5..	Laying concrete walks and curb	F. J. Thomson, Clerk.
Cal.,	San Diego	11 a.m., Mar.	5..	Paving with asphalt macadam	F. M. Lockwood, City Mgr.
Ind.,	Sullivan	noon, Mar.	6..	11 miles macadam road	F. M. Daniels, Co. Aud.
Md.,	Baltimore	noon, Mar.	6..	6.21 miles concrete and oil macadam roads	State Roads Comn.
Wash.,	Mt. Vernon	Mar.	6..	Constructing Jarmaine Valley road	Co. Engr., Skagit Co.
N. Y.,	New York	10.30 a.m., Mar.	6..	5,600 sq. yds. granite block pavement, curb and sidewalk	Douglas Mathewson, Pres. Boro of Bronx
Minn.,	Ivanhoe	10 a.m., Mar.	6..	State road work during 1917	K. A. Hansen, Co. Aud.
N. Y.,	Irvington	7:30 p.m., Mar.	6..	Paving Broadway	J. A. Murphy, Village Clerk.
La.,	Lake Charles	2 p.m., Mar.	6..	52 miles gravel road surfacing	Fred Shutts, Highway Engr.
Ind.,	Wabash	10 a.m., Mar.	6..	Constructing 2 gravel roads	F. P. Kircher, Co. Aud.
N. J.,	Augusta	4 p.m., Mar.	6..	Portable rock crusher, 8 to 12 tons per hour, with elevator, etc.	G. W. Fountain, Clerk.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL		NATURE OF WORK	ADDRESS INQUIRIES TO
Wash.,	Olympia	5 p.m., Mar.	6..	Pav. with brick, concr., asph., bit. or other material	City Engr.
Miss.,	Meridian	10 a.m., Mar.	6..	Scarifying, reshaping and rolling 50,000 sq. yds.; hauling 4,000 tons of stone 3 miles	J. T. Pinkston, Highway Engr.
Mich.,	Monroe	10 a.m., Mar.	6..	Constructing 13.57 miles 7-in. concrete road; bids will be taken on 4 and 5.57-mile sections	Co. Comnrs.
Ia.,	Boone	7.30 p.m., Mar.	6..	90,000 ft. curb and gutter	Robt. McCormick, City Engr.
Ind.,	Corydon	2 p.m., Mar.	6..	Constructing stone road	Sam C. Mauck, County Aud.
Ind.,	Shelbyville	11 a.m., Mar.	6..	Furnishing 1,600 cu. yds. gravel	F. W. Fagel, County Aud.
Ind.,	Mt. Vernon	2 p.m., Mar.	6..	21,382 ft. gravel road construction	J. R. Haines, Co. Aud.
Ind.,	Crawfordsville	10 a.m., Mar.	6..	Constructing concrete road	Dr. W. F. Batman, Co. Aud.
Ind.,	Monticello	10 a.m., Mar.	6..	Gravel, stone and Tarvia roads	A. G. Fisher, Co. Aud.
Ind.,	Princeton	11 a.m., Mar.	6..	Seven stone roads	J. H. Armstrong, Co. Aud.
Ind.,	Bloomington	2 p.m., Mar.	6..	Township road work	Horace Blakely, Co. Aud.
Ind.,	Decatur	10 a.m., Mar.	6..	Seven macadam roads	John Mosure, Co. Aud.
Ind.,	Valparaiso	2 p.m., Mar.	6..	Two miles of gravel road	C. A. Blachly, Co. Aud.
Ind.,	Knox	noon, Mar.	6..	Township road work	C. W. Weninger, Co. Aud.
Ind.,	Indianapolis	10 a.m., Mar.	6..	Gravel road work	L. K Fesler, Co. Aud.
Ind.,	Martinsville	1:30 p.m., Mar.	6..	Gravel road construction	Sam Watson, Co. Aud.
Ind.,	Goshen	10 a.m., Mar.	6..	Four concrete and gravel roads	A. R. Bemenderfer, Co. Aud.
Ind.,	Covington	2 p.m., Mar.	6..	Eight gravel and stone roads	H. W. Newlin, Co. Aud.
Ind.,	Bloomington	Mar.	6..	Paving South Walnut St	G. A. Davis, City Clerk.
Wis.,	Portage	Mar.	6..	3,300 sq. yds. asphaltic concrete, brick concrete, or bitulithic and 7,900 sq. yds. sheet asphalt	H. V. Tennant, City Engr.
Ind.,	Vincennes	2 p.m., Mar.	6..	Constructing 3 roads	J. I. Muentzer, County Aud.
Ind.,	Rockville	11 a.m., Mar.	6..	Constructing gravel road	Chas. Davis, Co. Aud.
Ill.,	Berwyn	8 p.m., Mar.	6..	2,500 ft. bit. con. pavt. and con. curb	Bd. of Local Impvts.
Ind.,	Indianapolis	10 a.m., Mar.	7..	Paving alleys and sidewalks	Board of Public Works.
Ind.,	Shelbyville	10 a.m., Mar.	7..	15,100 ft. gravel rd.; 13,450 ft. gravel and concr. rd	F. W. Fagel, Co. Aud.
Ind.,	Huntington	2 p.m., Mar.	7..	Constructing 4 roads	O. E. Eviston, Co. Aud.
Ind.,	Shelbyville	10 a.m., Mar.	7..	Five road drags and 2 road graders	F. W. Fagel, County Aud.
Ind.,	Auburn	10 a.m., Mar.	7..	10,050 ft. gravel road	S. P. Nelson, Co. Aud.
Md.,	Baltimore	11 a.m., Mar.	7..	41,000 sq. yds. sheet asphalt, 26,000 ft. curb, 3,500 sq. yds. brick gutters and 30,000 cu. yds. grading	Comnrs. for Opening Streets.
Ill.,	Sterling	10 a.m., Mar.	7..	9,400 sq. yds. brick or concrete pavement	R. R. Baer, Town Clerk.
Ky.,	Morgantown	Mar.	7..	Repairing roads; cost, $20,000	County Clerk.
Fla.,	Jacksonville	Mar.	7..	Street paving	L. D. Smoot, Comr. P. Wks.
O.,	Lima	noon, Mar.	8..	Grading, curbing and paving with brick, asphalt, wood block or asphaltic concrete	A. L. Metheany, Dir. Pub. Ser.
N. Y.,	New York	3 p.m., Mar.	8..	Repairing park walls; broken stone etc	Dept. of Parks, Bklyn., N. Y.
N. Y.,	New York	3 p.m., Mar.	8..	Furnishing and spreading 32,450 gals. tar	Dept. of Parks, Bklyn., N. Y.
La.,	Lake Charles	10 a.m., Mar.	8..	Paving with vertical fibre brick	Andrew Cook, Clerk.
Mich.,	St. Johns	5 p.m., Mar.	8..	Paving four streets	Wm. Cochrane, City Clerk.
Ind.,	Peru	10 a.m., Mar.	8..	Constructing two roads	F. K. McElheny, Co. Aud.
Ind.,	Evansville	10 a.m., Mar.	8..	Constructing township road	C. P. Beard, County Aud.
Ind.,	La Porte	10 a.m., Mar.	8..	Constructing county roads	F. A. Hausheer, Co. Aud.
Ind.,	Crawfordsville	10.30 a.m., Mar.	8..	Constructing gravel road	Dr. W. F. Batman, Co Aud.
Ind.,	Crown Point	1 p.m., Mar.	8..	Constructing gravel roads	Edward Simon, Co. Aud.
Ind.,	Indianapolis	10 a.m., Mar.	9..	Graveling, curbing and constructing walks	B. J. T. Jeup, City Engr.
Ind.,	Corydon	2 p.m., Mar.	9..	Constructing stone road	Sam C. Mauck, County Aud.
W. Va.,	Clarksboro	Mar.	9..	Grading and paving 4 miles of road	G. M. Harbert, Co. Engr.
O.,	Cleveland	noon, Mar.	9..	Paving and improving streets	Comnrs. of Engineering.
Kan.,	Osborne	2 p.m., Mar.	9..	Sheet asphalt, vertical fibre brick, concrete or bit. concr. pavement and concrete curb and gutter	Black & Veatch, Engrs., Interstate Bldg., Kan. City, Mo.
Mo.,	St. Louis	Mar.	9..	Alley improvements; cost, $11,000	E. R. Kinsey, Pres. Bd. of P. S.
Kan.,	Osborne	Mar.	9..	38,000 sq. yds. paving; cost, $80,000	City Engr.
Wash.,	Ritzville	2.30 p.m., Mar.	9..	5½ miles gravel road	F. R. Hewett, Construc. Engr.
Ga.,	Marietta	Mar.	10..	Street construction; cost, $40,000	K. T. Thomas, City Engr.
Ill.,	Bloomington	Mar.	10..	Paving seven streets; cost, $21,000	E. H. Packard, City Engr.
N. J.,	Port Murray	10:30 a.m., Mar.	10..	6,900 sq. yds. cinder pavement	Samuel H. Perry, Clerk.
Ind.,	Richmond	11 a.m., Mar.	10..	Two 4-horse road graders	L. S. Bowman, Co. Aud.
Ind.,	Kokomo	Mar.	12..	Concr. walks and curb; modern street pavements	Ben Havens, City Clk.
N. C.,	Canton	Mar.	12..	20,000 sq. yds. brick, concr. or bit. pavement	Town Clk.
N. Y.,	Watervliet	4 p.m., Mar.	12..	Removing old and relaying redressed granite block pavt	City Engr.
Ia.,	Oelwein	2 p.m., Mar.	12..	11,000 sq. yds. of pavt. and 4,600 ft. curb and gutter	G. H. Bishop, Engr.
Ind.,	Frankfort	2 p.m., Mar.	12..	24,548 ft. gravel roads	Edward Spray, Co. Aud.
Ind.,	Peru	noon, Mar.	12..	Paving with gravel and concrete and constr bridges	F. K. McElheny, Co. Aud.
Ind.,	Indianapolis	10 a.m., Mar.	12..	Graveling and paving; curbs and sidewalks	B. J. T. Jeup, City Engr.
Ala.,	Florence	Mar.	12..	Grading two miles and surfacing three miles of road	County Commissioners.
Ill.,	East Dubuque	4 p.m., Mar.	13..	Bridge approach requiring 1,550 sq. yds. brick pavement and 783 ft. sidewalk and curb	M. Tschirgi & Sons, Engrs., Amer. Tr. Bldg., Cedar Rpds.
Wash.,	Seattle	Mar.	13..	3½ miles road and bridge, cost $35,000	Sam Humes, County Engr.
Pa.,	West Berwick	8 p.m., Mar.	14..	19,600 sq. yds. brick pavement and 11,500 ft. concr. curb	R. Bruce Carey, City Clerk.
Wis.,	Milwaukee	10.30 a.m., Mar.	14..	300,000 gallons road oil and 300,000 gallons bituminous road binder and surfacing material	F. G. Simmons, Comr. Pub Wks.
Ind.,	Indianapolis	10 a.m., Mar.	14..	Grading, paving and constructing sidewalks	B. J. T. Jeup, City Engr.
O.,	Cadiz	March	15..	County road work; cost, $16,000	County Clerk.
Wis.,	Green Bay	Mar.	15..	35,000 gals. road oil; road machine	F. A. Torkelson, City Engr.
N. Y.,	Elmira	11 a.m., Mar.	15..	22,560 sq. yds. pavement, curbs, etc	City Engr.
Neb.,	Omaha	Mar.	15..	Street grading; cost, $30,000	J. A. Bruce, City Engr.
Tenn.,	Erwin	Mar.	16..	20,000 sq. yds. street pavement	H. W. Morgan, City Engr.
O.,	Marion	Mar.	16..	20,000 sq. yds. substantial paving	E. S. Ault, City Engr.
N. C.,	Rocky Mount	2 p.m., Mar.	16..	16,000 sq. yds. asphalt or bitulithic on concrete and 7,000 ft. curb and gutter	C. H. Harris, City Clerk.
O.,	Cleveland	Mar.	17..	County road work	E. G. Krause, Co. Clerk.
Wis.,	Racine	Mar.	17..	Paving with brick, sheet asphalt and concrete	Board of Public Works
N. Y.,	Albany	1 p.m., Mar.	19..	Bituminous treatment on state highways	Edwin Duffey, St. Highway Comnr.
O.,	Kent	Noon, Mar.	19..	Improving several streets	E. S. Rover, Village Engr.
Ind.,	Goshen	1:30 p.m., Mar.	19..	Two brick and concrete roads	A. R. Bemenderfer, Town Aud.
Ind.,	Kokomo	Mar.	19..	Resurfacing with modern pavement	Ben Havens, City Clerk.
N. J.,	Maplewood	8 p.m., Mar.	20..	3,000 tons broken stone and 60,000 gals. road oil	Edward Arcularius, Twp. Clk.
Ky.,	Olive Hill	Mar.	20..	Street work, $40,000 available	City Commissioners.
O.,	Canton	Mar.	20..	Constructing several miles brick and macadam	County Surveyor.
N. Y.,	Albany	1 p.m., Mar.	20..	Bituminous treatment on state highways	Edwin Duffey, St. Highway Comnr.
Va.,	Roanoke	Mar.	22..	Macadamizing, granolithic sidew'ks, concr. curb and gut.	F. L. Gibboney, City Engr.
Ind.,	Lawrenceburg	noon, Mar.	22..	Constructing county line road	H. E. Lutherbeck, Co. Aud.
Ky.,	Jamestown	Mar.	23..	County road work	Fiscal Court, Russell Co.
Ky.,	Hyden	Mar.	24..	Paving and improving streets	City Clerk.
Ky.,	Wayland	Mar.	24..	Improving several streets, cost $30,000	City Clerk.
Cal.,	Los Angeles	10 a.m., Mar.	26..	Constr. asph., stone, and brick and bit. pavts., and concr. and granite curbs, gutters, and sidewalks	H. B. Ferris, Sec. B. of P. Wks.
Ind.,	Kokomo	Mar.	26..	Improving roadway and constr. curbs, walks and gut'rs	Ben Havens, City Clerk.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
W. Va.,	Pennsboro	Mar. 29	Eight miles 9-ft. concrete road	H. H. Wilson, Mgr., Winston & Co.
Ill.,	Canton	Mar. 30	Road work, $20,000 available	E. F. Motsinger, Co. Highway Supt.
Ill.,	Naperville	Mar. 30	Concrete paving, $105,000 available	C. A. Ashley, City Engr.
Ill.,	Virginia	April 1	Road improvement; cost, $14,000	Co. Clerk.
N. Y.,	East Rochester	Apr. 1	8,730 sq. yds. bituminous or concrete pavement	M. Domras, Village Clerk.
Ky.,	Madisonville	Apr. 3	Two miles macadam road	County Clerk
SEWERAGE.				
Minn.,	Redwood Falls	Mar. 2	Tile drains; cost, $207,000	B. J. Reynolds, Engr.
Minn.,	St. James	1 p.m., Mar. 2	Tile drainage ditch; cost, $21,565	J. C. Jensen, Co. Aud.
O.,	Columbus	noon, Mar. 5	200,000 sewer brick; 5,500 ft. 4 to 30-in. bit. pipe; specials and fittings; catch basins, manholes, etc.	G. A. Borden Pres. Bd. of Pur.
Minn.,	Mankato	Mar. 5	Constructing sewer in Rock St.	H. F. Blomquist, City Engr.
Ia.,	Boone	noon, Mar. 5	7,500 ft. tile drains	J. R. Curry, Co. Aud.
Ia.,	W. Burlington	7 p.m., Mar. 5	Sewers and waterworks; cost, $70,000	Stevens & Stiles, Engrs., 708 Ridge Arcade, Kan City, Mo.
Minn.,	St. Paul	10:30 a.m., Mar. 5	Sewer on Como Ave.	H. W. Austin, Pur. Agt.
Kan.,	Emporia	5 p.m., Mar. 5	Constructing storm sewer	E. H. Wade, City Clerk.
Ia.,	Ottumwa	1 p.m., Mar. 5	Constructing trunk sewer	City Engr.
N. Y.,	New Brighton	noon, Mar. 5	Constructing temporary sanitary sewers	Engr. Bureau of Engrg.
N. Y.,	New York	10.30 a.m., Mar. 6	Constructing sewers, curbs, walks, etc.	Douglas Mathewson, Pres. Boro of Bronx.
Wis.,	**Chilton**	**Mar. 6**	**Constructing sewer system, cost $22,000**	**Jerry Donohue, Engr., Sheboygan, Wis.**
Ind.,	Shelbyville	Mar. 6	1,750 ft. 42-in. segment block and 775 ft. 36-in. segment block sewers	Geo. J. McBride, City Civil Engineer.
Okla.,	Okla. City	noon, Mar. 6	Constructing sanitary sewers	C. F. Semmelbeck, City Clerk.
O.,	Cleveland	Mar. 7	Constructing sewers in East View	C. F. Volk, Village Clk. of East View.
Kans.,	Pittsburg	Mar. 7	4,730 ft. 12 to 48-in. sewers	L. E. Curfman, City Engr.
Colo.,	Montevista	Mar. 7	44 miles tile and wood box drains; about 5.5 ft. deep	O. A. Cramer, Sec., Rio Grande Drainage District.
O.,	Cleveland	noon, Mar. 8	Sewers in several streets	Comnr. of Engrg.
N. Y.,	Brooklyn	11 a.m., Mar. 8	Rebuilding 255 ft. 54-in. brick sewer	Bureau of Sewers, 215 Montague St.
Pa.,	McKeesport	2 p.m., Mar. 12	Constructing 24,000 ft. 8 to 24-in. tile sanitary sewers	City Engr.
S. Dak.,	Madison	2 p.m., Mar. 14	Constructing tile drain	C. A. Trimmer, Co. Surveyor
N. J.,	Island Heights	Mar. 16	Constructing sewer extension and disposal plant	L. A. Croxton, Boro Engr., Mt. Ephraim N. J.
Pa.,	Williamsport	10 a.m., Mar. 16	Constructing many sewers	G. K. Harris, Supt. of Sts.
Wis.,	Beaver Dam	7:30 p.m., Mar. 19	10,245 ft. of sewers	Board of Public Works.
Cal.,	Los Angeles	10 a.m., Mar. 26	Constructing storm and sanitary sewers	H. B. Ferris, Sec. B. of P. Wks.
Ill.,	Hillsboro	April 1	Constructing sewer system; cost, $12,000	W. A. P. Warren, City Engr.
N. Y.,	East Rochester	Apr. 1	3,300 lin. ft. storm sewer	M. Domras, Village Clerk.
India,	Calcutta	2 p.m., June 1	Storm water pumping plant	C. C. Chatterjee, Sec. Corp. of Calcutta.
WATER SUPPLY.				
N. J.,	Hawthorne	8 p.m., Mar. 2	Pumping station, small reservoir, etc.	H. J. Harder, Engr.
Ia.,	W. Burlington	7 p.m., Mar. 5	Water and sewer improvements; cost, $70,000	Stevens & Stiles, Engrs., Kan. City, Mo.
Ia.,	Grinnell	noon, Mar. 5	11,560 ft. 4 and 6-in. mains and 10 hydrants	S. H. Crosby, City Mgr.
N. Y.,	New York	2 p.m., Mar. 6	Furn. connection sleeves and valves	Corpn. Counsel, Mun. Bldg.
Ill.,	Oak Park	4 p.m., Mar. 6	13,525 ft. c. i. mains, fire hydrants; 9,150 ft. brick and tile sewer; 62 manholes, 70 catch basins and 296 house drains.	Bd. of Local Improvements.
Mich.,	Dundee	1 p.m., Mar. 6	Constr. waterworks, including distribution system, elevated tank, reservoir and pumping plant	W. H. Tirrell, Village Clerk.
Wis.,	Hartford	2 p.m., Mar. 6	Drilling well	City Clerk.
Wis.,	**Chilton**	**Mar. 6**	**Constructing water works system, cost $45,000**	**Jerry Donohue, Engr., Sheboygan, Wis.**
Minn.,	Akeley	Mar. 7	50,000-gal. steel tank and tower	E. A. Graham, Acting Recdr.
N. J.,	Garfield	8 p.m., Mar. 9	Extending walls of concr, res'v'r and constr. roof	A. L. Pettersen, Engr., P. O. Bldg., Passaic.
Okla.,	Kaw City	1:30 p.m., Mar. 9	Complete waterworks and electric light system	Benham Engrg. Co., Colcord Bldg., Okla. City, Okla.
O.,	Ravenna	Mar. 10	Improving water works system	S. B. Horsfall, Dir. P. Serv.
Fla.,	Pensacola	11 a.m., Mar. 12	Two double-cylinder pressure water filters and 5 spray nozzles at Naval Aeronautic Station	Commandant of Station.
N. J.,	Ogdensburg	Mar. 15	450 tons c. i. pipe, 12 tons specials, 45 fire hydrants, 60 valves, constr. pipe line, 2 dams and filter plant	J. D. Ryder, Engr., 29 Bway, New York City.
N. D.,	Grand Forks	8 p.m., Mar. 15	Repairing and improving filtration plant	W. H. Alexander, City Aud.
Mich.,	Dowagiac	7 p.m., Mar. 16	Drilling two 10-in. wells 100 ft. deep	W. E. Reynolds, City Engr.
Tenn.,	Johnson City	7 p.m., Mar. 20	Furn. water meters: one hundred ⅝-in., two ¾-in., two 1-in., two 2-in.	P. F. McDonald, Cmr. & Engr.
Wyoming,	Sheridan	10 a.m., Mar. 20	14 fire hydrants, 23 4 and 6-in. valves and 25 valve boxes.	T. A. Morris, City Clerk
N. Y.,	Geneva	2 p.m., Mar. 20	Constructing slow sand filter units and remodeling regulating house	Board of Public Works
Ill.,	Gibson City	April 1	Constructing water and light plant	City Clerk.
MISCELLANEOUS.				
Idaho,	Lewiston	Mar. 5	Furnishing 8 to 30-in. iron culverts, road graders and slip and fresno scrapers	R. N. Wright, Clk. Co. Comrs.
Minn.,	Benson	Mar. 5	24 miles tile drains, 5 to 26-in.; 200,000 cu. yds. ditch excavation	D. P. Carney, Co. Aud.
Ind.,	Greensburg	1 p.m., Mar. 5	10 carloads crushed stone	J. C. Barbe, County Auditor
Miss.,	Jackson	Mar. 5	Furn. two good road trucks, tents, vit. and iron culvert pipes, wagons, etc.	W. W. Downing, Clk. Bd. of Co. Supvrs.
D. C.,	Washington	Mar. 6	Furn. lead and brass tubing, sheet lead, etc.	Gen. Pur. Officer, Pan. Canal.
Minn.,	Thief Riv'r F'ls	2 p.m., Mar. 6	Drainage ditches; cost, $4,036	T. P. Anderson, Co. Aud.
La.,	Alexandria	8 p.m., March 7	Levee constr., requiring 2,000,000 cu. yds. excav.	Bd. of State Engrs., New Orleans Court Bldg., New Orleans
N. Y.,	Brooklyn	3 p.m., Mar. 8	Furnishing 1 power sprayer	Dept. of Parks, Brooklyn.
N. Y.,	New York	Mar. 12	30,000 bbls. Portland cement at Sandy Hook, N. J.	U. S. Engr. Office, Army Bldg., 39 Whitehall St.
Wyo.,	Ft. Laramie	Mar. 15	2,227,000 cu. yds. excav., concr. placing and other work.	U. S. Reclamation Service.
Tenn.,	Memphis	Mar. 19	25,000 tons rip-rap stone	U. S. Engineer Office, Custom House.

STREETS AND ROADS.

Clifton, Ariz.—City Clerk M. A. Dauenhauer will receive sealed bids until March 15 for wall bridge and road bonds to the amount of $160,000.

Auburn, Cal.—Commercial Club indorses proposed Placerville-Coloma state road in El Dorado county, the work to be done by convict labor.

Sacramento, Cal.—A committee was named at Colusa to confer with the State Highway Commission relative to construction of a road from Grass Valley through Marysville to Colusa.

Sacramento, Cal.—The County Highway Commission has arranged for the advertising for bids for the first material needed in the construction of the new county highways, which will be started the latter part of the spring: 100,000 tons coarse rock and 60,000 tons of sand; for unloading into stock piles 100,000 tons coarse rock and 60,000 tons fine sand: 175,000 barrels of cement.

Sacramento, Cal.—The Auburn Commercial Club favors construction of a State road from Placerville to Coloma, in El Dorado county.

San Jose, Cal.—March 15 an election will be held to vote highway bonds for $1,500,000.

Shingletown, Cal.—A petition is being circulated asking the supervisors to establish a road district embracing that part of Supervisor District No. 3, lying east of the Sacramento River. The purpose is to vote bonds to build better roads in the mountainous region around Shingletown, Manton and Imwood.

Visalia, Cal.—Road boosters from every part of Tulare County are meeting with the supvrs. The supervisors will give detailed plans of the proposed $2,200,000 bond issue for a county highway system. The sentiments for the bonds is growing in all sections.

Visalia, Cal.—March 7 an election will be held to vote $2,200,000 bonds to construct 170 miles of concrete highways.

Bristol, Conn.—The City Council is considering the advisability of a street under the railroad tracks, west of the present Blakesley St. bridge to connect that street and Riverside Ave. at a point near the Penfield Saw Works.

New Haven, Conn.—City will spend $100,000 on paving work this year. Among the improvements is the completion of the paving in Ferry St., where a wood block roadway is being laid.

Fort Morgan, Colo.—County to grade 61 miles and gravel 50 miles of roads. Glenn S. White, Co. Engr.

Georgetown, Del.—To construct new roads, county commissioners considering appropriating $1,000,000.

Macon, Ga.—Corbin Ave. to be widened from 25 to 30 ft.

Champaign, Ill.—Walnut St. to be opened through to Neil St. The estimate of cost was placed at $5,995.30.

Decatur, Ill.—Two proposals to improve city streets by paving with asphalt are pending before the board of local improvements—Grand Ave. from Water St. west to Van Dyke St., Fairview Ave. and the two blocks in the western end of Cerro Gordo St.

Galesburg, Ill.—The $60,000,000 bond issue bill introduced in the house has the support of the powers that be and will probably pass. In this three hard roads are provided for Knox county. One will reach from Peoria to this city, another from this city to Galva, and a third from this city to Monmouth. An effort is being made to have this bill amended so that a fourth road will come to this city from the south.

Joliet, Ill.—Section of the city due for street pavements is in the Seventh Ward, west of Hickory Creek. Resolutions are being drawn for asphalt pavement in Iowa Ave., from Washington St. to Third Ave.; in Mississippi Ave. from Washington St. to Fourth Ave., and on Third Ave. from Union St. to Iowa Ave.

Joliet, Ill.—A petition for an asphaltic concrete pavement on Benton St. from Collins St. to the east city limits to the city engineer.

Mattoon, Ill.—For paving 2 miles with brick county will award contracts this spring. H. L. Shinn, Co. Supt. Highways.

Moline, Ill.—Ordinances for the paving of sections of 17th and 20th Aves. were introduced. Brick as the material.

Paris, Ill.—Edgar County plans for better highways during the year. Embansas township plan for 18 miles of improved highways, the work being divided among the principal roads of the township; also for a rock and gravel road.

Rock Island, Ill.—Ordinances for public improvement were considered for the paving of Fifth Ave., 2d to 13th Sts., estimated cost $26,212.08; for paving the same avenue from 13th to 17th Sts., $8,106.50. Brick is the material specified. Width, 24 ft.

Springfield, Ill.—Resolution passed for the paving with brick of Miller St., from 7th to 13th St., a sand curbing will be used; estimated cost of both has been fixed at $17,597.06 by City Engr. Wade Seeley, and Haugn St. from 5th to 6th Sts., brick pavement; will cost approximately $2,000. Ordinances will be offered in the Council shortly by Comnr. Hamilton providing for the two improvements.

Springfield, Ill.—Creosoted wood block will be used in repaving 66 blocks of the business district of the city during the present year.

Anderson, Ind.—Petition for paving Madison Ave. from White River north past the Country Club to the Lafayette township line granted by Board of Commission, with brick, width of 20 ft.; also for paving Smith St., concrete surface and gravel.

Brazil, Ind.—Clay county road bonds, two issues of $8,400 and $7,500, respectively, were sold to the Brazil Trust Co. at $265 and $235 premiums, respectively.

Evansville, Ind.—Newton W. Thrall, treasurer of Vanderburg county, sold four series of road bonds totaling $23,000. J. F. Wild & Co., of Indianapolis, bought three issues as follows: $10,000 at a premium of $365, $5,000 at a premium of $186; $4,600 at a premium of $151. The R. L. Dollings Co., of Indianapolis, bought the fourth series of $3,400 at a premium of $147. The issues run for 20 years, one bond expiring every six months. All bear 4½ per cent interest. Breed, Elliott & Harrison and E. M. Campbell & Co., of Indianapolis, also bid.

Franklin, Ind.—E. G. Bremer, treasurer Johnson county, sold $5,800 highway bonds to J. F. Wild & Co., Indianapolis, for $54 premium.

Indianapolis, Ind.—Resolutions adopted: Meridian, from Fall Creek to 215 ft. south; permanent improvement; curb; 25th St., from Meridian to first alley east, permanent improvement and curb.

Indianapolis, Ind.—Resolutions adopted: Tremont (w s) from Wilkins to Morris, cement walks; Park Ave. from Highland to Maple Road, permanent improvements; Arsenal Ave. (w s), from Washington to Market, cement walks.

LaPorte, Ind.—R. L. Dollings Co., Indianapolis, took two issues of LaPorte county highway bonds, $900 and $22,200, at respective premiums of $337.50 and $666.

Rockville, Ind.—Parke county highway bonds to the amount of $6,000 were awarded to J. H. Rush, of Marshall, Ind., for $56 premium.

Terre Haute, Ind.—The Bd. of Public Works reaffirmed the resolution providing for the paving of South Third St. this spring.

Vevay, Ind.—Switzerland County highway bonds to the amount of $6,640 were purchased by C. S. Tandy at $210 prem.

Wabash, Ind.—Louis Wolf, Wabash, Ind., took two issues of Wabash county road bonds, $11,000 and $16,000, at par and $922 premium; also bought $2,475 ditch bonds at premium of $30.

Cedar Falls, Ia.—City council plans extension of the First St. paving from Franklin St. to the westerly city limits, a date for final consideration of the matter was fixed as March 8. The total cost is estimated at $21,083.80.

Council Bluffs, Ia.—Representative J. C. Grason of Pottawattamie county presented in the Legislature a bill for an appropriation of $12,000 for material and expense of construction of an extension of the South Ave. paving through the grounds of the Iowa School for the Deaf.

Waterloo, Ia.—Paving, approximately 9 miles in length, was ordered in by the council in the resolution adopted. Streets included: Falls Ave. from C. G. W. tracks to Black Hawk bridge, 30 ft. in width, from Black Hawk bridge to city limits, 27 ft.; Manhard, Falls Ave. to Beck Ave., 27 ft.; Beck Ave., Manhard to Duryea, 27 ft.; Duryea, Beck Ave. to C. G. W. tracks, 30 ft.; Sullivan Ave., 2d to Elmwood Ave., 20 ft.; Summit Ave., Sullivan to Moir, 24 ft.; Reber Ave., Moir to Fletcher Ave., 27 ft.; Kimball Ave., 4th to 3d, 24 ft.; Kingsley Ave., 4th to Moir, 24 ft.; Sunset Rd., Prospect Blvd to Sheridan Rd., 24 ft.; 4th, Sheridan Rd. to Hampshire Rd., 24 ft.; Willston Ave., 4th to Denver, 24 ft.; Vermont St., 5th to Williston, 24 ft.; Bayard, 5th to Williston Ave., 24 ft.; Baltimore, Pleasant to Eureka, 24 ft.; Bertch Ave., 9th to 11th, 24 ft.; Hawthorne Ave., Hammond Ave. to 11th, 24 ft.; 1st, Commercial to Washington, 24 ft.; Commercial, 5th to C. G. W. tracks, 50 ft.; Home Park Blvd., Clough to Fletcher Ave., 34 ft., with center parking of 22 ft.; Fletcher Ave., Home Park Blvd. to Byrnes Park entrance, 30 ft.; Kingsbard Ave., Columbia Circle to Fletcher Ave., 32 ft., with 12 ft. centre parking; alleys in block 13, Whitney and Sedgwick addition, 16 ft.; 9th, Wellington to Bertch Ave, 30 ft.; Prospect Ave., Arizona to Idaho, 30 ft.; Alta Vista Ave., Arizona to Idaho, 30 ft.; Glenwood, Barclay to Cherry, 24 ft.; Irving, Independence Ave. to Glenwood, 24 ft.; Parker, Logan Ave. to 4th, 24 ft.; Burton Ave., W. C. F. & N. tracks to Conger, 24 ft.; Conger to Parker St., 30 ft.; Conger, Burton Ave. to Cedar River bridge, 24 ft.; Oakland Ave., Conger to Riehl, 20 ft.; Whittier Ave., Conger to Norwood, 20 ft.; Bryant Ave., Conger to Norwood ,20 ft.; Longfellow Ave., Riehl St. to Norwood, 20 ft.; Greenwood Ave., Riehl to Riverside Dr., 20 ft.; Glen Ave., Conger to Riverside Dr., 20 ft.; Riehl, Oakland Ave. to Riverside Dr., 20 ft.; Norwood, Whittier Ave. to Riverside Dr., 20 ft.; Riverside Dr., Conger to Longfellow Ave., 20 ft.; Lafayette, I. C. tracks to Virden Creek bridge, 40 ft.; Lincoln, Logan to I. C. belt line tracks.

Independence, Kan.—Ordinance approved for the grading and paving of the alley in Block 5. G. H. Krienhagen, City Clerk.

Wichita, Kan.—Ordinance approved requiring the Wichita Railroad & Light Co. to pave its right of way on Franklin Ave. from the west line of Buffum Ave. to the west line of Litchfield Ave. H. D. Lester, City Clerk.

Danville, Ky.—For about $10,000 city plans to improve streets.

Crowley, La.—First Road Dist. of Acadia Parish voted $400,000 bonds for proposed road construction work. J. Frankel, Secy. Road Dist. D. W. Thibodeaux, Secy. Police Jury.

Islip, L. I.—Election April 3 to vote $500,000 bond issue to build a logical system of permanent roads, probably concrete, on the principal arteries of through traffic.

Annapolis, Md.—Application has been made to the State Roads Commission for the construction of a section of state aid road in the Third district from Jacobsville to Lake Shore, the distance being about 2 miles. Also for another 2 mile stretch leading from the State boulevard to the village of St. Margaret's in the Third district.

Baltimore, Md.—Specifications for the completion of the Alameda and opening up Sinclair Alley and continuing it as a street along the south edge of Clifton Park was outlined by the annex commission. Altogether 16 streets are to be improved and the outlay will be approximately $100,000. The commission, however, is working on other specifications, as its whole program for the year will necessitate the expenditure of about $500,000. The Alameda improvement is the most expensive, as $25,000 will be needed to complete it from 28th St. to 33d St.

Webster, Mass.—Steel forms for cement sidewalks are asked, and if they are bought it will cost the town another $300.

Webster, Mass.—A cement sidewalk on the east side of Whitcomb St. from E. Main to the present sidewalk in front of the home of William Myers, on that street, is asked for, and the amount needed is set at $1,000.

Webster, Mass.—To grade Harris St. extension $300 is asked, and $700 is the amount fixed for grading Linwood St.

Kalamazoo, Mich.—Kalamazoo county plans $1,000,000 bond election to build roads. Address County Clk., Kalamazoo.

Reed City, Mich.—Road improvement bond issue, $13,000, carried.

Benton Harbor, Mich.—To vote on $70,000 road bond issue an election will be held in the near future.

Monroe, Mich.—Monroe county's road commission gave a personal inspection of the north end of that part of the Dixie highway and terminating at Rockwood, this county, with a view of pushing its completion to a termination during the coming summer. The road is 13.57 miles long and will be sold March 6th.

Duluth, Minn.—Bids opened by County Comnrs., in executive session, on four graveling jobs in the 5th Comnr. Dist. were rejected and County Aud. Halden authorized to readvertise for proposals.

Minneapolis, Minn.—Request for $500,000 for new bridge refused by Hennepin delegation; recommended for passage bills authorizing the Minneapolis City Council to issue $1,100,000 in bonds during the next two years. Issues approved are: $100,000 for paving, curb and gutter; $500,000 for trunk line sewers; $100,000 for the fire department; $100,000 for more municipal baths; $20,000 for the Franklin Ave. bridge; $100,000 to complete the 3d Ave. bridge.

Minneapolis, Minn.—Paving estimated to cost $311,736 has been ordered under the Elwell law by the city council for 1917. The most important project is the paving of W. 26th St. from Pillsbury Ave. to Lake of the Isles Blvd The estimated cost is $62,500.

Minneapolis, Minn.—Paving in addition to that already authorized for the season of 1917 will be ordered by the council paving committee at its regular meeting March 8. More than 80 paving projects have been proposed by aldermen and the city engineer's office has prepared estimates on all.

Hattiesburg, Miss.—The $100,000 road bond issue carried.

New Albany, Miss.—Bankhead highway bonds, $300,000, carried at recent election.

Magnolia, Miss.—Pike county road supervisors sold $50,000 bonds to construct proposed roads.

Cape Girardeau, Mo.—Middle St., between William and College, and of Morgan Oak St., between Aquamsi and Pacific Sts., will be paved; cost about $10,000; both to be made 35 ft. wide.

Hannibal, Mo.—Marion County Court decided to build and improve about 13 miles of highway in the county with the opening of spring; cost more than $31,000. The Philadelphia-Cherry Dell road matter was considered. To expend $10,000, a third of which has been subscribed by land owners, on the extension of the highway to the Shelby county line. The stretch of road that will be built includes more than 3 miles.

Sedalia, Mo.—An ordinance for the curbing and a resolution for the grading and paving of East Fifth St. from Engineer St. to Emmett Ave. will be introduced to council by East Sedalia citizens.

St. Joseph, Mo.—Plans for an extension of the boulevard system from 22d St., along the old bed of Grand Ave. Creek, to Maple Leaf Ave. and Grand Ave., will be discussed by the Second Ward Improvement Club.

St. Joseph, Mo.—Ordinance passed for grading Exchange St. from the south line of Beaver St. to the south line of the northwest one-quarter of Sec. 29, Twp. 57, Range 35, Prescribing a Benefit District.

St. Joseph, Mo.—Ordinance passed for grading and sidewalks: Sixth St. from the north line of Hyde Park Ave. to the south line of Harmon St. Joel E. Gates, City Clk.

Hastings, Neb.—An issue of paving bonds, $44,000, has been registered by State Audtior.

Wayne, Neb.—Public Service Club committee discussed drainage; paving committee was appointed to circulate a petition among property owners to secure endorsement of the proposed improvement as a substantial support for the city council.

Atlantic City, N. J.—A resident of Washington Ave. requests City Commissioners that the street be provided with curbs and gutters.

Camden, N. J.—Ordinances passed for the paving with asphalt Jefferson St. from Broadway to Fourth, Winslow between the same thoroughfares, Fourth from Winslow to Jefferson, and Woodlynne Ave. from Broadway to Ninth, and the south side of Main St. from Second to Elm.

Hopewell, N. J.—Council will discuss improving the borough streets with workmen.

Passaic, N. J.—The matter of opening and extending Chase Ave. will come up for confirmation at the meeting on Mar. 12.

Rutherford, N. J.—Park Ave. in East Rutherford, a street, will be repaired this spring. Pub. Serv. Corpn. to aid.

Oaklyn, N. J.—The ordinance to establish grade on Beechwood Ave. from White Horse pike to a point 100 ft. east of Johnson Ave., passed.

Oaklyn, N. J.—Borough council petitioned to establish grade on Johnson Ave., between Beechwood and Lakeview Aves. Referred to the highway committee.

Trenton, N. J.—Employes of the city engineering department are engaged preparing maps showing the various streets to be improved this year.

Auburn, N. Y.—DeKalb county highway bonds were awarded as follows: Threeis sues in amounts of $18,100, $20,000 and $27,000 to the Union Trust Co., at premiums of $215, $240 and $325; $56,000 to J. F. Wild & Co. for $640 premium; $27,000 to W. H. Williner for $325 premium.

Brooklyn, N. Y.—The long-pending improvement of Fort Hamilton Pkway. Park Comnr. Raymond V. Ingersoll has asked the Bd. of Estimate for $90,000 in corporate stock for putting the neglected parkway in order from 72nd St. to the Shore Rd. at Fort Hamilton, and in addition will put in a request for $10,000 in special revenue bonds to meet the cost of immediate repairs in the vicinity of 72nd St., where, it is alleged, there are many ruts and holes.

Elmira, N. Y.—The following paving work will be done this year: South Walnut St. from Hudson St. to Broadway; LaFrance St. from the Erie tracks to Pennsylvania Ave.; West Washington Ave. from the Erie tracks to Walnut St.; Erie St. from LaFrance to Miller Sts. This street will be 19 ft. wide, including the 6-in. curbing on either side of the 18-ft. wide brick.

Gloversville, N. Y.—Petitions asking pavements, repair of and the grading of the following streets were received: Burlington Ave., Helwig St., West 8th Ave., between Bleecker and Wilson Sts., and in North St., a pavement from Bleecker St. to the bridge.

Asheville, N. C.—City bonds to the amount of $35,000 were ordered sold and the proceeds used to pay the city's part of the cost of street improvements made in 1916.

Elizabethtown, N. C.—Have voted in favor of issuing road bonds: Elizabethtown township, $20,000; Cyprus Creek township, $12,000.

Hendersonville, N. C.—At estimated cost of $15,000, C. F. Sumner, Asheville, N. C., intends constructing streets and sidewalks in Columbia Park, this place.

Raleigh, N. C.—Senator Gray introduced a bill authorizing a $50,000 bond issue for roads in Forsyth payable in from one to five years.

Wadesboro, N. C.—March 7, J. E. Hart, chairman county commissioners, receiving bids for $100,000 road bonds.

Jamestown, N. D.—Bids to be asked soon for paving six streets. Wm. Aylmer, city attorney.

Canton, O.—An ordinance of necessity for the appropriating of property to widen Waynesburg Rd. S. E., and for opening Tyler Ave., S. E., between 4th St. and the Waynesburg Rd. was passed.

Canton, O.—Resolution asked a plank crosswalk at Plain Ave. and Sherlock Pl., N. E., and the establishment of the grade in 15th St., N. E., between Royal and Grace Ave., N. E.

Canton, O.—The street committee reported favorably on the opening of 12th St., S. E., to Housel Ave., S. E. Member Stansbery.

Canton, O.—City Engineer Sarver estimated the cost of paving 6th St., N. E., from Mahoning Rd. to the east creek, at $27,936; 14th St., N. W., from Market Ave., N., to Yale Ave., N. W., at $12,278; improving Bonnot Pl., S. E., at $12,669.

Canton, O.—A petition received from property owners in Arlington Ave., S. W., asking street to be paved from 7th St. to 12th St.

Grafton, O.—Road bonds for $650,000 will be voted March 7.

Cincinnati, O.—City Commissioner Joseph Hermann has prepared plans and specifications for the repair of Monmouth St. with reconstructed concrete. The property owners will bear the entire cost, which is figured at $2.20 a front foot.

Erie, Pa.—Ordinance passed for the paving of Liberty St. from 26th to 32d Sts. All streets in the future in the city the benefitted property owners must pay the entire cost of the improvement including the intersections.

Hamilton, O.—New outlets for city to be provided. Mayor has plan to utilize dirt from river channel. Names committee to take up the matter. Extension of South Second and North Third St. included in plan.

Sandusky, O.—An expenditure of $33,000 will be needed to carry out the 1917 program of maintenance on 72 miles of county road adopted by the Co. Comnrs. This includes the purchase of new equipment at a cost estimated by the Co. Engineer of $6,900; 12,430 tons of crushed stone, 88,500 gals. of oil and 550 gals. of asphalt to be used will cost $13,446.25; labor and supplies, $13,922.75, and a general expense of $1,500. It is proposed to purchase the following equipment; road scarifier, $500 5-ton motor truck, $4,500; four 1-yd. car unloaders, $200, and one 40-ton elevating unloader, $700; total, $5,900.

Zanesville, O.—An organization having for its object the construction of an improved highway from Cincinnati to Wheeling via Zanesville will be formed. Route of the proposed improvement is over the Maysville Pike from Cincinnati to this city, thence to Wheeling via the National Pike.

Zanesville, O.—Even though the estimate of cost of the city's portion is nearly $23,000 more than estimates last year, several members of City Council are inclined, it appears, to go ahead with the paving of 12 city streets, voted for by the people 16 months ago. Service Director Roach has rejected all bids recently made on the Forrest Ave. paving and the North 4th St. repaving because they exceeded the engineer's estimates made last year. New bids for both streets will now be asked for under new estimates prepared by the engr.

Zanesville, O.—A brick roadway laid on a concrete base was unanimously indorsed as the type of improvement desired on the East Pike by Eastern Muskingum county taxpayers.

Zanesville, O.—The Sherman-Sheridan Highway Association, having for its object the building of an improved highway from Cincinnati to Wheeling, was organized in this city. Dr. O. L. Bonifield, of Cincinnati, was made president.

Okmulgee, Okla.—County sold $800,000 good road bonds.

Sallisaw, Okla.—Road and bridge bonds for $21,500 will be voted Mar. 24.

Toss, Okla.—$15,000 bonds to build road and bridges was defeated.

McMinnville, Ore.—City will hold special election March 20 to vote $90,000 bonds for proposed city improvements. A. C. Chandler, city recorder.

Oregon City, Ore.—County has been petitioned to widen road through Springtown.

Portland, Ore.—Comnr. Dieck has submitted to the Council, without recommendation, a petition for the improvement of East 13th St. from Alberta to Roselawn Ave.

Roseburg, Ore.—The Roseburg Commercial Club has passed resolutions requesting the state highway commission designate the wagon road from Roseburg to Myrtle Point as a State highway. The county will build one new bridge.

Harrisburg, Pa.—City may ask voters to pass upon three loans. Completion of the park belt from Reservoir to Wildwood Park; $50,000 for paving street intersections, for the garbage disposal plant and ash collection outfit.

Hazleton, Pa.—City advertising for gutter and pavement bids.

Hazleton, Pa.—Paving plans will be ready by first week in March. Contracts will be awarded this year for the paving of Green St. from Vine to Cedar, Church and Vine Sts. from Diamond Ave. to 6th St.

Wilkes-Barre, Pa.—County tax is increased for improvements. Levy raised to 4½ mills on $330,000,000 valuation. Besides boosting the tax rate, the co. comns. also decided that a bond issue of $675,000 will be necessary. Rate is necessary because of the cost of the Wilkes-Barre Pittston county road, $200,000; the soldiers and sailors monument, $100,000; new armory site, $60,000; widening of No. 14 viaduct, $32,000; eliminating dangerous hill near the Lehigh Valley cut-off on the Bear Creek Blvd., $15,000. The bond issue is to raise funds for the West Market St. bridge and the Wapwallopen bridge. The commissioners estimate the cost of the local bridge at $500,000, and the down river town structure at $175,000.

Beaufort, S. C.—An election will be held March 12 on the issuing $15,000 bonds for the improvement of Bay St., between New and Hamar Sts. R. R. Legare, city clerk. Address H. G. Otis, city manager.

Charleston, S. C.—A bill has been introduced in the legislature which provides for an election to vote on the

question of issuing road bonds to the amount of $275,000.

Darlington, S. C.—Paving bond issue of $50,000 carried. E. R. Cox, Mayor.

Spartanburg, S. C.—Spartanburg county will issue bonds in the sum of $1,000,000 for the construction of highways under the direction of a county highway commission.

Jackson, Tenn.—An ordinance introduced to pave a section of Main St. from Royal to Cumberland. Another section of this street will be included in a paving district to be formed later.

Rogersville, Tenn.—Chairman board of county commissioners, H. B. Stamps, receiving bids March 15 for $200,000 road bonds.

Amarillo, Tex.—An election resulted in favor of $50,000 paving bonds. J. N. Brosby, Mayor.

Beeville, Tex.—City plans paving about 30,000 sq. yds. J. S. Fenner, City Engr.

El Paso, Tex.—County Comnrs. decided to advertise for bids for building a stretch of gravel road lying between Fabens and Fort Hancock. This is the road for the completion of which the comnrs. voted to issue county warrants to the value of $50,000.

Glen Rose, Tex.—Road warrants to the amount of $22,000 carried.

McKinney, Tex.—An election to be held in the Allen Rd. district No. 10 to vote on $100,000 road bonds March 31.

San Antonio, Tex.—Bids have been called on the paving of the following streets: Grand Ave. from Ave. C to river bridge; Jones Ave. from river bridge to Camden St.; Myrtle St. from San Pedro Ave. to North Flores St.; Austin St. from Carson to Grayson Sts.; San Pedro Ave. from Summit Ave. to Bushnell Ave.; Summit Ave. from McCullough St. to 212 ft. west; Ruiz St. from Medina St. to North Flores St.; ten alleys in city blocks Nos. 418, 419, 420, 421 and 425.

Ceredo, W. Va.—Town has voted to issue bonds to the amount of $33,000 for road paving. Means the building of the last link in the Piedmont road from Huntington to the Big Sandy River and with arrangements now being made by the county court of Cabell county a practically continuous highway from Ashland, Ky., through Boyd county, Ky., and Wayne and Cabell counties, W. Va., to the Putnam county line.

Bellingham, Wash.—Petitions will be circulated for paving of Northeast Diagonal Rd.

Chehalis, Wash.—Lewis County Commissioners are preparing to invite bids for 10,000 bbls. cement, 4,200 yds. gravel and 2,800 yds. sand, etc., as needed.

Chehalis, Wash.—City Attorney Murray instructed by council to draw up resolutions for paving Cascade St. from Prindle to Main Sts., 24 ft. wide. Work will be started early in spring by contract.

Chehalis, Wash.—Change to be made in the National Park Highway, 3 miles west of Chehalis, at Claquato Hill. Planned to build a new road around the base of the hill.

Olympia, Wash.—The City Council has passed an ordinance for the paving of West 4th St. Resolutions were adopted providing for sidewalks on Washington St. and Mill St. City Engr. was instructed to present estimates for a wooden bridge to span the West Waterway. Engr. Ray Wood reports to the council that a steel bridge over the West Waterway would cost $100,000 and a wooden one would cost $23,000.

South Prairie, Wash.—County commissioners to be petitioned for a county pavement to reach from Orting to South Prairie.

Eu Clair, Wis.—City council passed ordinance for the concrete paving of the following streets. On 5th Ave. from Grand Ave. to Chestnut St.; on Chestnut St. to Bellinger St.; on Bellinger St. to Platt St. Bids for the work are now being advertised. Will cost in the neighborhood of $28,000.

Green Bay, Wis.—A resolution to appropriate $260 for buying a road machine was referred to the board of public works.

Green Bay, Wis.—Bids on 35,000 gallons of road oil for oiling streets of the city are called. Councilman George M. Green was authorized to complete a list of road machinery needed by the street department so bids may be secured on the equipment.

Kenosha, Wis.—At recent election county voted for road work $185,000 bonds.

Monroe, Wis.—A $1,000,000 road bond issue will be submitted to the voters in the spring.

River Falls, Wis.—For paving of Main St. city intends selling $45,000 bonds.

Superior, Wis.—City Comn. approved plans submitted by the Duluth Street Railway Co. for substituting granite blocks where they will be compelled to tear up asphalt paving on Bway, bet. Tower and Hammond Aves. to make room for tracks for the new "bayfront loop line"; taking steps to widen Hill Ave. from 12th St. to provide room for the street railway company's tracks. The street will be widened 17 ft.

Tomah, Wis.—City Council ordered about 15 blocks of brick paving on main streets; W. H. Randall, City Clk.

Winona, Wis.—Buffalo county will vote April 13 upon a proposition for the sum of $350,000 with which to construct good roads. The same will expand to half a million with state aid. A hundrel miles of improved highway will stretch into all parts of the county. Macadam, concrete and gravel. Width has not been decided.

Whitewater, Wis.—Streets are to be paved with brick in business section and concrete in residence districts.

Toronto, Ont.—The city council referred back the proposal to pave a section of Cherry St.

Victoria County, Ont.—Victoria County is preparing plans prior to adopting a good roads scheme. Engineers, Smith & Smith, Lindsay, Ont.

St. Lambert, Que.—The opening of 5 new streets is contemplated this year. Town Engineer, H. H. Gibeau.

BIDS RECEIVED AND CONTRACTS AWARDED.

(*Indicates Contracts Awarded.)

Cambridge, Ill.—Bids opened by city Feb. 14 as follows: To pave 6,050 sq. yds. with asphaltic filler on 5-in. concrete base: Pub. Service Constr. Co., Omaha, Neb., $15,428; Gund Graham, Freeport, Ill., $15,508; H. K. Rhodes, Lincoln, Ill., $15,971. H. G. Stokes, Engr., Kewanee, Ill.

Oak Park, Ill.—Paving assessments tax No. 470, *John W. Barker, 501 W. Fifth Ave., Maywood, Ill.; No. 476, *Standard Paving Co., 29 S. La Salle St., Chicago; No. 471, *Commonwealth Impr. Co., 133 W. Washington St., Chicago, and No. 465, *H. G. Goelitz Co., 810 North Blvd., Oak Park. Engr., W. T. Sargent, Village Hall. E. H. Hill, Village Pres., Village Hall.

Springfield, Ill.—The following state aid contracts by the state highway commission, Feb. 14, 1917: Alexander county, sec. C, novaculite macadam, *H. L. Wedding, Cairo, Ill., $17,970.80; Franklin county, sec. D, concrete, *H. R. Cawood, Mt. Vernon, Ill., $8,905.59; Jasper county, section E, earth, *Jas. Benefiel, Newton, Ill., $6,191.64; Madison county, sec. C, bituminous macadam resurfacing, *Powell & Gauen, Collinsville, Ill., $5,374.03; Massac county, sec. C, bridge, J. R. Sleeter, Metropolis, Ill., $700; Mercer county, sec. F, earth, *E. A. Lord Constr. Co., Monmouth, Ill., $4,109.31; Mercer county, sec. H, earth, *E. A. Lord Constr. Co., Monmouth, Ill., $4,346.50.

Brazil, Ind.—Clay and Vigo county commissioners, for a county line road, to *Keegan Bros., Brazil, Ind., $5,689.

Indianapolis, Ind.—Park Ave., from 46th to 48th, cement walks, to *John Arnold.

South Bend, Ind.—For construction of a cement road in Penn township, St. Joseph county, to *J.Ackerman Co., of LaPorte, for $26,200.

Cedar Rapids, Ia.—The paving on curb and gutter on Bever Ave. from 22d St. to the city limits and on Seventh St. from Fifth Ave. to 16th St., were as follows: Ford Paving Co., $6,402; Percy P. Smith, $6,092; F. K. Hahn, $7,193; J. B. Ford & Son, $6,271. All the bids were held over. Bever Ave., 22d St. to the city limits, price per sq. yd. brick block on 5 ins. of concrete with an asphalt filler: F. K. Hahn, $2.20; P. P. Smith, $2.25; Ford Paving Co., $2.14; F. K. Hahn put in one bid on this job for asphaltic concrete at $1.68 per sq. yd. First Ave., Fourth to Tenth St., and First Ave., 13th to 15th St.: Brick block with asphalt filler, Wm. Horrabin, $2.382; F. K. Hahn, $2.36; Ford Paving Co., $2.32. Horrabin allowed 1 cent per sq. yd. for the old bricks; Hahn, 3 cents, and Ford, 5 cents. Asphaltic concrete, 2½-in. wearing surface on 6 ins. of concrete: Horrabin, $2; Ford, $1.95. Sheet asphalt, Horrabin, $2.08; Ford, $2.04. Bitulithic, Horrabin, $2.03; Ford, $2.04. First Ave. from First St. to Fourth St.: Creosoted block, Horrabin, $3.20; Ford, $3.15; Hahn, $3.18. Asphaltic concrete, Horrabin, $2; Ford, $1.95. Sheet asphalt, Horrabin, $2.08; Ford, $2.04. Bitulithic, Horrabin, $2.03; Ford, $2.04. Brick block, asphalt filler, Horrabin, $2.38; Ford Paving Co., $2.32; F. K. Hahn, $2.36. First St. from Fifth Ave. to B Ave.; Second St., First Ave. to B Ave.; Third St., First Ave. to B Ave.; Fifth St., Third Ave. to A Ave.; Fourth Ave., First St. to Second St.; Second Ave., First St. to the bridge. Creosoted block, Horrabin, $3.20; Ford, $3.15; Hahn, $3.18. Asphaltic concrete, Horrabin, $2; Ford, $1.95. Sheet asphalt, Horrabin, $2.08; Ford, $2.04. Bitulithic, Horrabin, $2.03; Ford, $2.04. Vitrified brick, Horrabin, $3,32; Ford, $2.32; Hahn, $2.36.

Baltimore, Md.—Board of awards let contract for street paving aggregating nearly $700,000. Chairman R. Keith Compton of the paving commission. *P. Flanigan & Sons, $225,996; Lawson Construction Co., Norfolk, $188,948; *Baltimore Asphalt Block & Tile Co., $127,585; *American Paving Co., $121,893; *P. F. Reddington, $24,287, includes more than half of the paving work on the streets to be done this year. City Engr. Cooksey.

Frederick, Md.—The state roads commission awarded contracts totaling more than $100,000. Included were those for superstructures of the draw spans of the Sassafras River bridge connecting Queen Anne and Kent counties and the Ocean City bridge over Sinepuxent Bay, in Worcester county. The *Strobel Steel Construction Co., of Chicago, captured both jobs with bids of $14,765 and $15,065 respectively. The other contracts, largely for oiling and supplying chips on completed roads, include work in Frererick county and are as follows: Applying stone chips to roads treated in Division No. 1, comprising Worcester, Wicomico, Somerset and Dorchester counties, *Walter S. French, Morristown, N. J., 4,300 tons, 20 cts. per ton. Supplying oil and sweeping roads in Division No. 1, *United Gas Improvement Co., of Philadelphia, $6,812.65. Applying stone chips to roads in Division No. 2, comprising Talbot, Caroline, Queen Anne, Kent and Cecil counties, *Walter S. French, 8,100 tons at 20 cts. per ton. Supplying oil and sweeping roads in Division No. 2, *United Gas Improvement Co., $13,511.56. Stone chips to the roads in Division No. 3, comprising Baltimore-Washington Blvd. in Howard county, Harford and Baltimore counties, *Walter S. French, 12,072 tons, at 20 cts. per ton. Supplying oil and sweeping roads in Division No. 3, *United Gas Improvement Co., $18.147.67. Stone chips on roads in Division No. 4, comprising Anne Arundel, St. Marys, Charles, Prince Georges and Montgomery counties, *Walter S. French, 8,010 tons at 25 cts. per ton. Supplying oil and sweeping roads in Division No. 4, *United Gas Improvement Co., $15,216.34. Stone chips on roads in Division No. 5, comprising part of Montgomery, Frederick, Howard, Carroll and part of Washington county, *Walter S. French, Morristown, 10,525 tons at 25 cts. per ton. Supplying oil and sweeping roads in Division No. 5, awarded to two companies: contract for oil to *du Pont Chemical Works, New York, at $16,756.90, and for sweeping and applying material to the *Good Roads Co., Baltimore, at $4,857.33. Applying stone chips on roads in Division No. 6, comprising Washington, Allegany and Garrett counties, *Walter S. French, 8,013 tons, at 25 cts. per ton. Supplying oil and sweeping roads in Division No. 6, for supplying oil to *United Gas Improvement Co. at $18,850.18, and for sweeping and applying material to the *Good Roads Co. at $6,440.29.

Battle Creek, Mich.—The *Burt Portland Cement Co. of Bellevue to furnish the city with 10,000 barrels of cement, at $2.05 per barrel f. o. b.

Sault Ste. Marie, Mich.—Five contracts for gravel have been let by the board of public works as follows: *Richard Larke, 250 yards furnished in place on 18th St., at $1.10 per yd. *Louis Belanger, 300 yds. on Seymour Hill, furnished in piles, at $1.10 per yd. *William White, 830 yds. on Minneapolis St. and 200 yds. on Court St., furnished in place, at $1.45 per yd. *Thomas Bye, 830 yds. on Adams Ave. and 100 each on Superior and Kimball Sts., furnished in place, at $1.45 per

yd. *Louis Bernier, 600 yds. on Spruce St. and 260 yds. on Greenough, furnished in piles, at $1.25 per yd.

Berlin, N. J.—*J. S. Tisler, Clayton, N. J., at $5,881.40, for roads as follows: Cedar Brook road from Tanesboro to Camden county line, at $22,707.60, and 1¾ miles gravel in Lindenwald road, from White Horse Hotel to Highbridge. Board of Freenolders of Camden county. E. E. Stratford, Chm., Berlin.

Camden, N. J.—The committee on streets and highways, bids for sewers, cement, sand, pebbles, asphalt, fuel oil, cement sidewalk and curbing. The contract for the construction of the sewer in 24th St. from the Delaware River to River Ave., and Pierce Ave. from 24th St. to East State St., and 21st., 22d, 23d Sts. from Pierce Ave. to Wayne Ave., and 18th, 19th and 20th Sts. from Pierce Ave. to River Ave., *John M. Kelley Contracting Co. Cement, *Taylor Bros.; sand, to *Norcross & Edmunds, *Penn Sand & Gravel Co., 211 S. 9th St., Philadelphia; for asphalt, *Atlantic Refining Co., 3144 Passyunk St., Philadelpaia; for fuel oil, *Standard Oil Co., of New Jersey; for laying cement sidewalks and cement curbs as follows: First district, *C. Bauman Co.; Second district, *Louis Williams; Third district, *Frank B. Sweeten; Fourth district, *New Era Concrete Co.; Fifth district, *Prince Concrete Co.

Hunterton, N. J.—By county to *M. Irving Demarest, Sewaren, N. J., at $15,660, for furnishing crushed stone for use during 1917. Grant Davis, Co. Engr.

Trenton, N. J.—Board of Freeholders for furnishing and applying a tar preparation to the White Horse-Bordentown, White Horse-Yardville-Crosswicks and the Yardville-Windsor-Newtown roads to *John O. Gretton, at $5,681.10.

Woodbury, N. J.—Board Chosen Freeholders Gloucester Co. Cross Keys-Turnerville road, 45,825 sq.2yds. concrete surface and foundation, *Michael Staub, Mamaroneck, N. J., $97,210.93.

Albany, N. Y.—Sealed proposals were received by the State Comn. of Highways, No. 55 Lancaster St., Albany, N. Y., for the improvement by state aid of the following highways, on Feb. 19, 1917: Road No. 1468—Coeyman-Indian Fields, Pt. 1, Albany County, 1.45 mi.; no proposals received. Road No. 1449—Maine-Glen Aubrey, Broome Co., 5.35 mi.; Louis Mayersohn, Albany, N. Y., $71,302. Road No. 1450—Castle Creek-Whitney Point, Broome County, 6.93 mi.; T. H. Gill Co., Binghamton, N. Y., $108,800.80. Road No. 1470 — Kennedy - Ellington, Chautauqua County, 4.19 mi.; no proposals received. Road No. 1171—Afton-Coventry, Pt. 1 & Afton-Bettsburg, Chenango County, 7.12 mi.; Paddelford & King, Sherburne, N. Y., $78,446.45; Woodruff-Edgecomb Co., East Branch, N. Y., $82,097; Frederick A. Biggi, Albany, N. Y., $82,526. Road No. 1488 — Altona - Obers Corners, Clinton County, 5.95 mi.: Louis Mayersohn, Albany, N. Y., $68,481.75; Spellman-Oliver Co., Chateaugay, N. Y., $69,770.50; Frederick A. Biggi, Albany, N. Y., $70,478.50. Road No. 5629—Spencertown-Austerlitz, Columbia County, 5.02 mi.: Antonio Colarusso, Hudson, N. Y., $66,313. Road No. 1500—Marathon-Cortland, Part 4, Cortland Co., 3.33 mi.: S. P. Hull, Cortland, N. Y., $35,351; Rossney Contg. Co., Buffalo, N. Y., $36,115; Dana W. Robbins Co., Inc., Utica, N. Y., $36,444. Road No. 1445—East Aurora-Lancaster Pt. 2, Erie County, 3.41 mi.: Bison City Eng. & Contracting Co., Buffalo, N. Y., $57,128.75. Road No. 1446—South Newstead-Peters Corners, Erie County, 0.91 mi.: Cold Spring Cons. Co., Buffalo, N. Y., $17,384.50. Road No. 1491—Marilla-Marilla Station, Erie County, 2.97 mi.: H. E. Rainer, Buffalo, N. Y., $35,490.50; Bison City Eng. & Contr. Co., Buffalo, N. Y., $35,520.80; Cold Spring Cons. Co., Buffalo, N. Y., $42,014.50. Road No. 5634—Evans Center-Farnham, Erie County, 5.26 mi.: No proposals received. Road No. 1411—Wadhams Mills-Whallonsburg, Essex County, 4.95 mi.: No proposals received. Road No. 1376—Bull Run-Bleecker, Fulton County, 2.80 mi.: No proposals received. Road No. 1458—Morehouseville-Piseco, Pt. 1, Hamilton County, 6.82 mi.: St. Lawrence Const. Co., Inc., Albany, N. Y., $129,143.75. Road No. 1362—Van Hornesville-Starkville, Herkimer County, 5.84 mi.: No proposals received. Road No. 1481—Elmgrove-Ridge, Monroe County, 2.73 mi.: No proposals received. Road No. 1498—Manny Corners-Blue Corners, Montgomery County, 3.63 mi.: No proposals received. Road No. 5590—Lewiston Heights-Lewiston, Niagara Co., 0.61 mi: Kennedy Constr. Co., Albany, N. Y., $24,474.90. Road No. 1355—North Western-Boonville, Pt. 1, Oneida County, 6.15 mi.: No proposals received. Road No. 1356—North Western-Boonville, Pt. 2, Oneida County, 5.74 mi.: No proposals received. Road No. 5638—Parish-Camden, Oswego County, 5.63 mi.; Spellman-Oliver Co., Chateaugay, N. Y., $73,887.25. Road No. 1461—Schuylerville-Gansvoort, Saratoga County, 9.06 mi.: No proposals received. Road No. 1464—High Falls-Stone Ridge, Ulster County, 1.80 mi.: No proposals received. Road No. 1501—Chestertown-Hague, Pt. 4, Warren County, 4.59 mi.: Kingsbury Cons. Co., Hudson Falls, N. Y., $127,919.25. Road No. 1456 — Westchester Ave., Westchester County, 1.09 mi.: Harlem Contracting Co., 2 Rector St., New York City, $36,979.15; Frank E. Murphy Contracting Co., Inc., Portchester, N. Y., $38,449.75; Dalcy & Merritt, Portchester, N. Y., $38,979.15

Sealed proposals were also received for the completion of the following highways: Road No. 1227—Redwood-St. Lawrence County Line, Jefferson County, 4.60 mi.: Harry W. Roberts, Utica, N. Y., $61,428.23; Arthur F. McConville, Ogdensburg, N. Y., $66,864.49; Dale Engineering Co., 249 Genesee St., Utica, N. Y.,

Albany, N. Y.—Sealed proposals were received by the State Comn. of Highways, No. 55 Lancaster St., Albany, N. Y., for the improvement by State Aid of the following highways, on Feb. 20, 1917: Road No. 1486—Whitney Point-Lisle, Broome County, 2.78 mi.: Thomas L. Ryan, Binghamton, N. Y., $42,525.25; T. H. Gill Co., Binghamton, N. Y., $43,165'.25; Nathan E. Young, Harpersville, $43,539.25. Road No. 1487—Chenango Bridge-Kattelville, Broome County, 4.108 mi.: Frank Stento, 129 Susquehanna St., Binghamton, N. Y., $50,774; Thos. L. Ryan, Binghamton, N. Y., $50,780; Woodruff-Edgecomb Co., East Branch, N. Y., $51,014.50. Road No. 1489—Chazy-Champlain, Clinton County, 3.34 mi.: No proposals received. Road No. 1492—Ellicott Creek-Gettzville, Erie County, 2.90 mi.: Bison City Eng. & Contr. Co., Inc., Buffalo, N. Y., $27,095.50; Cold Springs Cons. Co., Buffalo, N. Y., $27,204.50; Louis H. Gipp, Buffalo, N. Y., $27,999. Road No. 1493—Transit-Walcottsburg, Erie county, 3.02 mi.: Cold Spring Constr. Co.; Buffalo, N. Y., $36,633.55; Bison City Eng. & Contg. Co., Inc., Buffalo, N. Y., $37,376.05. Road No. 1494—Lancaster-Clinton St., Erie County, 2.34 mi.: Bison City Eng. & Contg. Co., Inc., Buffalo, N. Y., $40.515.50. Road No. 5635—Marilla-Wales Station, Erie County, 5.78 mi.: No proposals received. Road No. 1496 — Westport-Elizabethtown, Essex County, 8.85 mi.: No proposals received. Road No. 5626 — Oppenheim-Dolgeville, Fulton County, 4.90 mi.: No proposals received. Road No. 5523—Wells-Speculator, Pt. 2, Hamilton County, 6.74 mi.: St. Lawrence Constr. Co., Albany, N. Y., $168,518.25. Road No. 1363—Paines Hollow-Stone House, Herkimer County, 5.67 mi.: No proposals received. Road No. 1499—Scottsville-West Henrietta, Monroe County, 4.56 mi.: Michael H. Ripton, Rochester, N. Y., $78,618.50; Dale Engineering Co., 249 Genesee St., Utica, N. Y., $78,971. Road No. 1396—Sheridan Blvd-Burnside Ave. and Rockaway Tpk., Nassau County, 2.99 mi.: H. J. Mullen Contg. Co., 289 Fulton St., Jamaica, N. Y., $114,209.10. Road No. 1462—North Western-Boonville, Pt. 3, Oneida County, 3.45 mi.: No proposals received. Road No. 5604—Utica-Poland, Pt. 1, Oneida County, 1.05 mi.: No proposals received. Road No. 1485 — Worcester - Decatur, Otsego County, 4.09 mi.: No proposals received. Road No. 1424—Stone Schoolhouse-North Petersburg-Vermont State Line, Rensselaer County, 4.95 mi.: C. W. Tryon, Poland, N. Y., $75,606.60. Road No. 1502—Short Clove, Rockland County, 0.24 mi.: No proposals received. Road No. 1389—Gouverneur-Edwards, Part 2, St. Lawrence County, 4.60 mi.: Henry P. Burgard Co., 1968 Fillmore Ave., Buffalo, N. Y., $71,869.25; Richard Hopkins, Prov. N. Y., $78,999.40. Road No. 1482—Pattersonville-Scotch Church, Schenectady County, 5.42 mi.: No proposals received. Road No. 1467—Cobleskill-Sharon Springs, Pt. 2, Schoharie County, 5.25 mi.: No proposals received. Road No. 1211-A—Waterloo Vil.-South Virginia St., Seneca County, 0.05 mi.: S. Soper & Sons, Seneca Falls, N. Y., $3,693.75; Kennedy Constr. Co., Albany, N. Y., $3,896.50; J. W. Brennan Constr. Co., Geneva, N. Y., $3,950. Road No. 1495—Bridgehampton-Devon, Suffolk County, 11.58 mi.: Withdrawn. Road No. 5627—South Lansing-Myers, Tompkins County, 2.46 mi.: Dana W. Robbins, Inc., Utica, N. Y., $36,906.75; Kennedy Constr. Co., 534 Bway, Albany, N. Y., $38,902. Road No. 1059—Clyde-Resort, Pt. 3, Wayne County, 1.88 mi: Hendrickson-McCabe Constr. Co., Inc., Spenceport, N. Y., $16,560; Frederick A. Briggi, Albany, N. Y., $16,900; Kennedy Constr. Co., 534 Bway, Albany, N. Y., $18,533.30. Sealed proposals were also received for the completion of the following highway: Road No. 5601—Saugerties Village, Ulster County, 1.85 mi.: Frederick J. Kinney Co., Inc., Buffalo, N. Y., $41,236.66. Sealed proposals were also received for the furnishing and delivering of broken stone: County of Onondaga & Wayne, B. S. Contract No. 73: Sidney & Johnson, Norwich, N. Y., $14,691; Pathfiinder Constr. Co., Fulton, N. Y., $14,734.50; McGreevey, McGuigan & Baum, 309 Robinson Bldg., Elmira, N. Y., $15,032.10.

Cambridge, N. Y.—By state of New York to *Gifford Constn Co., 335 Fulton St., Jamaica, L. I., N. Y., for 7 miles of macadam road. Will take bids about March 8 on materials.

Lockport, N. Y.—Board of supervisors opened bids Feb. 9 for road work. Roland R. Singer, Chmn. Special Road Com. Lowest bids: *McKinney-McGuire Constr. Co., Niagara Falls, N. Y., Evershed St., 0.702 mile, $12,197, estimate $11,831; Lockport St., 1.74 mile, $32,367, estimate $32,198, both roads lead out of Niagara Falls. C. B. Whitmore Co., Buffalo, N. Y., $17,719, estimate $15,481; Lockport-Warren's Corners stone road, north of Lockport, 0.7407 miles. Meyer & Meyer Corp., Depew, N. Y., $43,968, estimate $32,549; Hess road, 4.2 miles, in town of Newfane; bids rejected on last 2 roads. Will readvertise. Fred H. Krull, Clk.; Thomas N. Brennen, Co. Highway Supt.

Olean, N. Y.—Bids opened by city Feb. 15 to pave about 19,600 sq. yds. on West State St.: *D. D. Dugan & Sons, Olean, N. Y., $49,066; J. B. Hurley, Inc., Fredonia, N. Y., $53,196; H. E. Bunce, Olean, N. Y., $55,033; Dunkirk Constr. Co., Dunkirk, N. Y., $55,989. E. E. Allen, Supt. Streets.

Syracuse, N. Y.—The board of contract and supply let three paving contracts: North Beach St., between Canal and Hawley Ave., with asphalt, $5,504.20, to *F. J. Baker, of University Blk.; South Wilbur Ave., between Harbor Brook Gifford St., asphalt, $11,061.10, to *Guy B. Dickison; Almond St., from the end of the present pavement to Burt St., asphalt, at $17,876, *Guy B. Dickison.

Cleveland, O.—Contracts for paving 7 streets at a total estimated cost of $40,000 were approved by the city board of control. Bids for paving 10 other streets were rejected on motion of Service Director Bernstein, who declared the bids above the city's estimate made in 1915.

Dayton, O.—*Wm. Kershner and Chas. F. Smith & Co., 1401 N. Main St., for repaving in Jefferson St. J. E. Barlow, director public service.

Piqua, O.—*John Hennesy, paving 1st and 2d Sts., between Staunton and Yale Sts. Brick and waterbound macadam, concrete curb and gutter, concrete sidewalks, at $6,262. L. E. Chamberlin, director public service; engineer, Albert Schroeder, city hall; J. M. Lloyd, city clerk.

Wooster, O.—Griest & Markley of this city were the lowest bidders for the Bever St. paving job, bids opened by the board of control. Bidder: Howard Hering of Cleveland. Bids will be tabulated by Engineer Mowery.

Astoria, Ore.—By County Court to *Fred C. Feldschau, Hillmook, Ore., at $20,631, for grading and to *Montague-O'Reilly Co., Portland, Ore., at $41,574, for paving with asphaltic concrete 4 miles of Lewis and Clark road. Geo. F. Parker, Co. Surv., P. O. Box 124.

Dallas, Ore.—*Barnham Bros., at $852.30, for the construction of bunkers for the crushed rock that will be used on streets.

Salem, Ore.—The Salem Construction Co. and the Salem Sand & Gravel Co. submitted bids of 50 cts. each per cu. yd. on 5,000 yds. of gravel.

Harrisburg, Pa.—State highway department opened bid Feb. 20 for stone chips and crushed stone for use of the maintenance division forces during the 1917 working season. Bids ordered checked. Contractors will be notified later. Stone chips were from the Rodgers Sand Co., Pittsburgh; The Downing Sand & Gravel Co., Erie; The Portage Silica Co., Youngstown, O.; The Nickel Plate Gravel Co., Erie; The General Crushed Stone Co., Easton; Buffalo Cement Co., Buffalo, N. Y., and the Iron City Sand Co., Pittsburgh, Pa.

Everett, Wash.—Snobomish county opened bids Feb. 13, pavements one-course concrete and necessary details 53,000 sq. yds. 7 ins. thick in center, 5 ins. on side and 16 ft. wide. *Bancroft & Morgan, Everett, Wash., $1.29 per yd.; excav., 35 cts. cu. yd.; total, $74,282.65. Bidders: S. J. McHugh Const. Co., Seattle, Wash., $1.28 per sq. yd.; excav., 35 cts; $74,961.15. Washington Paving Co., Tacomo, Wash., $1.29½ per sq. yd.; excav., 50 cts.; $76,018.50. Kaiser Paving Co., Everett, Wash., $1.41 per sq. yd.; excav., 50 cts.; $81,741. A. B. Dean, chief dep. engr.

Milwaukee, Wis.—Racine Stone Co., of Racine, at $1.50 a yard f. o. b. cars on 25,000 yds. of crushed stone to be purchased by the department of public works. Commissioners may decide to readvertise.

Sheboygan, Wis.—The bids for various concrete paving and retaining wall jobs for 1917 in this city opened. For concrete paving on East Water St. from Center Ave. to North Fifth St. and from Pennsylvania Ave. to Jefferson Ave.; on North Sixth St. from Pennsylvania Ave. to East Water St., and on Jefferson Ave. from North Seventh St. to East Water St.: Pestein & Nauman, $14,723.75; G. P. Scharl, $16,044.75; John Braun, $15,-288.85. Concrete paving on Park Ave. from North Fifth St. to North Second St.: G. P. Scharl, $10,433.70; Pestein & Nauman, $10,033.60; John Braun, $9,565.20. Concrete paving and curbing on Dillingham Ave. from Lake Shore Drive to the west line of Swift's addition: Pestein & Nauman, $20,618.50; G. P. Scharl, $23,244.50; John Braun, $21,670.

Sheboygan, Wis.—City engineer received the following paving bids on North 3d St.: Christ Johnson, Oshkosh, $4,158; Pestien & Nauman, city, $3,594; Franz Radloff, Plymouth, $3,543; John Braun, city, $3,484.50.

Brantford, Ont.—See "Sewerage."

SEWERAGE

Marvell, Ark.—See "Water Supply."

Brawley, Cal.—Mar. 19, $17,000 bonds will be sold for concrete basin and sludge sewer. G. R. Wade, City Engr.

Sugar City, Colo.—City plans new sewer district.

Trinidad, Colo.—Taxpayers will vote April 3 on $30,000 bond issue to repair and extend its present sewer system and construct a purification tank.

Miami, Fla.—An election will be held Mar. 20 to issue $150,000 bonds for constructing sewer system and sewage disposal plant.

St. Petersburg, Fla.—The $180,000 bond issue for sewage disposal plant and water front improvement was carried. Work will start as soon as bonds have been sold. W. J. Overman, Dir. of P. Wks.

Mendota, Ill.—Cost about $30,000 plans being prepared for sewer system and septic tank, to include 5½ miles of tile. Wm. Weidner, City Clk.

Springfield, Ill.—For extending town branch sewer at cost about $175,000. City Engr. Wade Seeley has completed plans.

Story City, Ia.—City making plans for sewerage system.

Wichita, Kan.—Ordinance approved authorizing the construction of sub-district A of Sanitary Sewer No. 8.

Owensboro, Ky.—From report city contemplating sewer improvements.

Ocean City, Md.—Probable cost $30,-000 construction of a sewer system contemplated.

Duluth, Minn.—Adopted resolution for construction of sanitary sewer in Water St., near 23d Ave. east.

Duluth, Minn.—Ordinance passed to appropriate $258.77 for the construction of a sanitary overflow sewer in Superior St. from Pitt Alley to culvert east of 49th Ave. East.

Lake Crystal, Minn.—See "Water Supply."

Minneapolis, Minn.—See "Streets & Roads."

Cape Girardeau, Miss.—The establishment of one or perhaps two additional sewer districts was virtually decided by council on the West End sewer proposition. The change of the sewer districts was suggested by City Engr. Stiver. A consulting engineer will be employed by the city to aid Mr. Stiver in his work. As soon as the plans for the sewer and all preliminary work have been completed, the council committee will report to the council and an ordinance specifying the route the sewer is to take, fixing the size of the sewer pipes.

Cape Girardeau, Mo.—The report of the special committee appointed by Mayor Kage to arrange for the West End sewer was adopted.

Havelock, Neb.—An election will be held Mar. 13 to issue sewerage and water system bonds of $5,000.

Valentine, Neb.—Sewer system, $26,000 bonds, carried at recent election. W. E. Haley, city clerk.

Cliffside Park, N. J.—To cost about $25,000 city planning sewer system. McClure McClure, City Engr.

Fanwood, N. J.—Council has engaged Fuller & McClintock, Engrs., to make surveys and estimates of cost for installation of sanitary sewer system to connect with the Plainfield system.

Ford, N. J.—For the installation of a complete sewerage system, Morgan Larson, Twp. Engr., making surveys and estimates of cost.

Linden, N. J.—To cost about $75,000, township commission contemplates building trunk sewer in St. George and the Greater Elizabeth sections. Jacob L. Bauer, Co. Engr., Elizabeth.

Passaic, N. J.—Union township commissioners passed resolution to purchase 9 acres of meadow land for the purpose of erecting a sewage disposal plant. The sum of $2,500 was allowed.

Trenton, N. J.—$40,000 bonds has been sold for sewer improvements.

Trenton, N. J.—Heads of the American Bridge Co. have consented to the city's plan to construct a drain across its lands from Cass St. to the Delaware River. Cost, approximately $10,000. It will practically be an extension of Sewer No. 60, and, aside from caring for the water carried by it, will also take care of surface and storm water in the vicinity of Cass, Union and other streets.

Asheville, N. C.—The purchasing agent instructed to purchase 50 manholes and covers for the city sewers.

Newcomerstown, O.—Village Clerk Frances B. Angle receiving bids Mar. 17, $30,000 sewer assessment bonds.

Springfield, O.—A resolution was read for the first time declaring it necessary to construct a combined sewer in Water St. from Buck Creek to Mt. Vernon Ave. to connect adjoining sewers.

Billings, Okla.—Plans being prepared for sewer system. An election will be held soon to issue bonds.

Pendelton, Ore.—For constructing septic tanks to dispose of city's sewage, cost about $10,000, contract will soon be let.

Athens, Pa.—To cost about $35,000, plans being prepared for sewer system. R. R. Fernow, Engr., 817 Weighman Bldg., Philadelphia. C. W. Tidd, Boro. Secy.

Harrisburg, Pa.—The ordinance providing for building sewers in Beaver, Rubv, Berryhill, 21st and Central Sts. passed.

Hazleton, Pa.—Ordinances providing for the erection of sewers on Diamond Ave. from Seybert to Hayes Sts., Grant St. and Peace St. were introduced by Councilman Gerlach and passed.

Kane, Pa.—Sewage disposal plant and additional sewers considered. Roy S. Braden, City Engr.

Lebanon, Pa.—See "Water Supply."

Norristown, Pa.—Borough contemplating storm and sanitary sewers. A. Camerson Corson, Boro. Engr.

Vandergrift, Pa.—Sanitary sewer system and sewerage treatment plant plans approved by state dept. health, Harrisburg.

West Middlesex, Pa.—Election March 7 to vote on issuing $10,000 bonds for constructing sewer system.

Lockport, Tex.—For improvements and extension of sewer system, city sold $35,000 in bonds.

Port Arthur, Tex.—See "Water Supply."

Hinton, W. Va.—Extending sewer system is reported considered.

Beloit, Wis.—City council considered recommendations of additions to the 1917 sewer program. Plans included only sanitary, and no storm sewers. Solution of the long vexed problem of draining the district west of Hackett St. is being gradually worked out by the board of public works and the engineering department.

Janesville, Wis.—City commission considered the proposition of the Glen St. sewer and after going over the terms of the agreement furnished by railway engineers, referred the matter to the board of public works. The sewer, it is planned, will be built under the railway embankment just this side of the arch on N. Main St., and will empty "Bunker Hill" flood waters into the river somewhere in the vicinity of the lower icehouse. The Board plans to consider the agreement and contracts in the near future.

Waynesboro, Wis.—Board of supervisors allowed the separate school district $700 for the privilege of attaching the sewer system of the court house and jail to the sewer system of said separate school district, no further expense incurred by the county except the keeping up of that part of system belonging exclusively to the county.

Renfrew, Ont.—Construction of about 1 mile of 15-in. sewer main at Plaunt Park and Barnet subdivision considered. Engineer, John R. Stewart.

Ford City, Ont.—For sewerage system, the Provincial Board of Health has approved plans. Tenders will be called. Engrs. Owen & McKay.

BIDS RECEIVED AND CONTRACTS AWARDED.

(*Indicates Contracts Awarded.)

Savannah, Ga.—For constructing storm water sewer, *Carolina Constr. Co., Union National Bank Bldg., Columbia, S. C., at $44,459.

East St. Louis, Ill.—*Keeley Bros. Contracting Co., for constructing the Winstanley Ave. sewer, at a cost of $17,000.

Indianapolis, Ind.—Local sewer in first alley east of La Salle St. from 20th to 21st, *Columbia Construction Co.

Stratford, Ia.—For constructing sewer system and disposal plant, let to *H. J. Canthroe, Omaha; sewers, $22,778; disposal plant, $4,145.

New Bedford, Mass.—Bids received for centrifugal pumps and electric motor for the intercepting sewer system were referred to William F. Williams, chief engineer, for tabulation: Allen Engineering Co., $1,835; Wood Boiler Co., $1,652; Lawrence Pump & Engine Co., $1,352; Lawrence Machine Co., $1,515; R. E. Wood & Co., $2,050; Worthington Pump Co., $2,-200; Alberger Pump Co., $1,965. Two bids for furnishing and installing a switchboard for the intercepting sewer system also referred: The Briggs Electric Co. bid $850 for Cutler, Hamer Co. apparatus, and Potter & Sarle bid $800 on General Electric apparatus.

Camden, N. J.—See "Streets and Roads."

Kearny, N. J.—*Olaf Johnson, 701 Devon St., Arlington, N. J., at $2,710, pipe sewer, Devon St., Arlington. Town Surv. Harry P. Kreiner, 790 Broad St., Newark. Wm. B. Ross, Town Clk., Town Hall, Kearny.

Cleveland, O.—Henry Balogh, Fair view, O., drainage system mastick road, 2,450 lin. ft. 4 to 12-in. drain pipe at $1,130. Engr. W. A. Stinchcomb, Court House. C. G. Krause, Clk. Cuyahoga County, Court House.

Cincinnati, O.—*M. J. Connelly, 636 W. 8th St., sewer, 145 lin. ft. 8-in. vit. pipe, 1 manhole in Stark St., bet. Dunlap and Branch. Engr. Frank S. Krug, City Hall. Chas. F. Hornberger, Dir. Pub. Service. Edw. P. Durr, Secy., City Hall.

Newburgh Heights, O.—*A. Marra, 2276 E. 105th St., Cleveland, for sewer near Cleveland, at $10,410. John Fitzgerald, clerk.

Springfield, O.—City Manager Ashburner to *Philip Huonker, the sewers in the following streets: Sanitary sewer in Cecil St. from the first alley east of Limestone St. to a point 200 ft. west of Mason St., $335.44; sanitary sewer in Gothic St. from Edwards Ave. to Catawba Ave., $505.50; sanitary sewer in Middle St. from Warder St. to Nelson St., $1,-003.50.

North Braddock, Pa.—Chas. Planting, Trafford, Pa., sewer, $3,749, from Sixth St. to High St. Engr., Geo. F. Siefers, North Braddock.

York, Pa.—City Council opened bids for sanitary sewer work. Action was deferred until after the drafting of the supplemental appropriation bill necessary since the tax rate was raised. Paul R. Hostetter offered on the 16 items of the specifications totaled $3,276.75. Bid itemized was $1.15 per ft. for approximately 100 ft. of 8-in. terra cotta pipe, 0 to 6 ft. deep; $1.30 per ft. for approximately 100 ft. 8-in. terra cotta, 6 to 8 ft. deep; $1.50 per ft. on same length of 8-in. terra cotta, 8 to 10 ft. deep; $1.75 for same length, 10 to 12 ft. deep; 90 cts. each for 20 5-in. Y's on 8-in. pipe;

95 cts. each for 100 5-in. V branches; 75 cts. each for 100 5-in. ⅛ bends; $1.15 per ft. for 2,000 ft. 5-in. house connections; $2 each for 5 or 6-in. saddles; $2 each for 5 or 6-in. collars; $2 per ft. for tunneling; $4.15 per yd. for 25 yds. rock excavation; $50 for one manhole; $55 for flush tank; $5.75 per cu. yd. for concrete, and $40 per 1,000 ft. for lumber. Bids offered by G. H. Heiges & Son, $3,390. Items were: $1.20, $1.25, $1.50, $1.65, $1, 75 cts., 75 cts., $1.20, $2, $1.25, $1, $5, $50, $75, $6 and $35.

Aberdeen, S. C.—See "Water Supply."

Richmond, Va.—*H. L. Driscoll, the lowest bidder for constructing a sewer in the alley south of Victor St., from the alley east of Second Ave. to the avenue, $140.25.

Milwaukee, Wis.—The sewerage commission, for the construction of the third section of the Kinnickinnic Valley intercepting sewer, from Clinton and Burnham Sts. to a point 600 ft. south of the Kinnickinnic River, in the Chicago road, *Wisconsin Tunnel & Construction Co., for $174,953.

Adelaide Township, Ont.—*Wilson Bros., care of Ambrose Topping, Township Clerk, Kerwood, Ont., for tile drains.

Brantford, Ont.—City council for supplies: Sewer pipe, *Hamilton & Toronto Sewer Pipe Co., Ltd., Hamilton; cement, *Ontario Portland Cement Co., Ltd., Brantford.

WATER SUPPLY.

Argenta, Ark.—Argenta will own a municipal waterworks plant without an assessment being levied against the property of the city, according to a plan adopted by comnrs. of Waterworks District No. 2, created for the purpose of taking over the Argenta pipe line and plant of the Arkansas Water Co. The plan does not even call for the first assessments, as originally decided upon.

Marvell, Ark.—As engineers for water and sewer system, cost about $32,000, town has engaged U. S. Sanitary Septic Tank Co. (W. J. Kearney, general manager).

Paris, Ark.—City to decide on a new water system.

Colorado Springs, Colo.—An election will be held April 3 to vote $150,000 water works improvement bonds.

New Smyrna, Fla.—To complete water works, city will vote $10,000 bonds.

St. Petersburg, Fla.—See "Sewerage."

Casey, Ill.—This place will have water works. Of the $60,000 necessary to construct the plant, $45,000 already has been subscribed. The water will be brought from the North Fork, 5 miles distant.

Rock Island, Ill.—City commission considered a 6-in. water main on 11th St., 34th to 42d Ave. Estimated cost, $4,-172.60.

Springfield, Ill.—The City Council will make another effort to receive bids within reason for a supply of water pipe to meet needs during the present year and also for use in constructing another main trunk line from the pumping station at the river to the city.

Spring Valley, Ill.—Appropriations to cover the needs of the city waterworks and electric lighting plant for the coming fiscal year were submitted by Comnr. W. J. Spaulding of the Dept. of Public Property to Council. A total of $226,400 is asked for the water works. The large amount asked results from provisions being made for constructing a new main trunk line from the pumping station to the city, and also for service extensions within the city in connection with the general plan of improvements. Of the total, $175,000 is for additions and extensions, principally water mains, such as the trunk line and service extensions and other improvements at the river station. The remainder of the sum, $51,-000, is to cover operating expenses. For the municipal electric light plant the commissioner asks a total of $81,550. Of the total sum, $44,000 is to cover operating expenses, and $37,500 the cost of the new generator, to be installed at a cost of $20,000, and for additions and extensions.

Boyden, Ia.—This spring 24 water meters will be installed.

Clinton, Ia.—Water works system will be constructed.

Keokuk, Ia.—Plans for a coagulant house, three stories high, to be built adjoining the pumping station of the Keokuk Water Works Co., have been received by L. W. Young, superintendent. Work will be commenced just as soon as the weather permits. Will be 24 ft. sq. by 36 ft. high.

Waverly, Ia.—March 26 an election will be held to issue water works system bonds; $15,000.

Liberal, Kan.—City contemplating issuing $19,000 bonds for water works improvements.

Bossier City, La.—An eletcion will be held April 20 to vote on a $30,000 bond issue for water works.

South West Harbor, Me.—Water company will soon be in the market for pipe and fittings from ½-in. (glv.) to 2-in. (glv.), and 6-in. c. i. pipe. H. L. Gray, Supt..

Clinton, Mass.—Bonds may be issued to sink an artesian well for the water supply of the town.

Chicopee, Mass.—Installation of a 12-in. main, a new standpipe, installation of water meters, recommended by water commissioners.

Revere, Mass.—Laying about 1 mile of water mains considered.

Bay City, Mich.—An appropriation of $800,000 in bonds to improve water system under consideration.

Pontiac, Mich.—City commission sold to Hanchett Bond Co., of Chicago, $210,-000 of water extension and improvement bonds, part of the $275,000 authorized at the special election Jan. 27, premium of $1,410, with interest at 4½ per cent. Bidders for the bonds were: Cummings, Prudden Co., Toledo, premium of $4,808 at 4½ per cent.; Detroit Trust Co., Detroit, premium of $701 at 4¼, and Watling, Lurchen & Co., Detroit, premium of $6,005 at 4½ per cent.

Ada, Minn.—On several streets city will extend water mains.

Benson, Minn.—A bond issue for water works system will soon be voted on.

Duluth, Minn.—Ordinance passed to appropriate $30,000 for laying of water and gas mains for 1917.

Minneapolis, Minn.—As consulting engineer for new filtration plant, city council has retained W. N. Jones, Bayless Ave., St. Paul, to cost about $1,-200,000.

Biloxi, Miss.—For the pumping station, city contemplating buying a new pump, capacity 1,000 gals. per minute.

Meridian, Miss.—Calling for bonds to the value of $150,000, to finance the construction of the first 50,000,000-gal. unit of the proposed 100,000,000-gal. reservoir adjoining the present one, two ordinances have been introduced into the City Council.

Pass Christian, Miss.—For construction of water works, $40,000 bonds will be issued.

Springfield, Mo.—For installation of outlet and septic tank an election will be called in April to issue $45,000.

Helena, Mont.—The supreme court recently ruled that the city of Great Falls can go ahead with the installation of its filtration plant.

Bayonne, N. J.—City Engr. Walter L. Clarkson, to prepare plans for water plant. Cost, about $500,000.

Bloomfield, N. J.—For c. i. pipe contract will be let in March. Wm. R. Rawson, Supt. Water Works.

Elizabeth, N. J.—Water meters will be installed by the water company.

Mendham, N. J.—Bids will be received until April for proposed reservoir of 8,-000,000 gallons capacity, 14,000 ft. 8-in. water pipe, cost about $30,000. Ordinance has not passed final reading. Boro. Clk., Leo Robinson. F. O. Pitney, Engr., Morristown.

Pennsgrove, N. J.—The Du Ponts will contract for a 100,000-gallon reservoir and install an electrically-driven 1,000-gallon capacity pump.

Gloversville, N. Y.—Residents of Clyde St. petitioned the common council to install an adequate water main and system for conveyance of sewage.

Niagara Falls, N. Y.—City to advertise for bids for the construction of water mains.

Canton, O.—Council passed an ordinance to issue $138,000 bonds; $71,000 will be water works bonds to be used in improving the water system, and the balance of $67,000 will be refunding bonds to care for bonds in the sinking fund falling due and which the city is not prepared to meet; $51,000 in enlarging present mains, and $10,000 in placing mains in new streets; $10,000 will be to buy meters to be installed in places where a large amount of water is used and wherever waste water is found. The resolution declaring it necessary to appropriate the 10-acre tract of the J. A. Rice Farm north of the city for a reservoir site also was passed. The finance committee reported favorably on the water works department spending $4,000 to drill more wells near Navarre Rd., S. W., in the west creek valley, and to improve the present wells located there.

Canton, O.—Starret was authorized to get bids and buy a trenching machine for the water works office; also to purchase supplies for the water works department.

Deshler, O.—Municipal water works bonds of $33,000 will be sold Mar. 13. R. W. Hoskinson, Clerk.

Lima, O.—A premium of $1,357.30 was offered by G. E. Denison & Co. of Cleveland, high bidders for $49,000 water main refunding bonds, which were opened by City Aud. Rupert. R. L. Dollings Co. of Columbus was the second highest bidder; $1,347.50. Other bids: R. M. Grant & Co., Chicago, $730: R. L. Day & Co., Boston, $661.60; First Natl. Bank, Cleveland, $1,249.60; Tillotson & Wolcott Co., Cleveland, $1,283.80; Provident Savings Bank & Trust Co., Cincinnati, $1,048.60; Feibel-Elischak Co., Cincinnati, $1,165; J. C. Mayer & Co., Cincinnati, $622.30; Weil, Roth & Co., Cincinnati, $1,264.20; Seasongood & Mayer, Cincinnati, $3541 Breed, Elliot & Harrison, Cincinnati, $1,-058.40; Spitzer, Rorick & Co., Toledo, $1,267.50; Cummings, Pruden & Co., Toledo, $777; Stack & Braun, Toledo, $62.10; New First Natl. Bank, Columbus, $1,-112.60; Hornblower & Weeks, New York, $1,077.51; Harris, Forbes & Co., New York, $1,019.51; A. E. Aub & Co., Cincinnati, $250.

Marietta, O.—Council adopted an ordinance to issue $75,000 bonds for new reservoir on the site of the old city tanks on Gendale Hill; will be of reinforced concrete; a capacity of 4,000,000 gallons. The estimates on the new basin, as compiled by City Engineer E. Frank Gates and submitted to council, are as follows: To acquire title to land $1,400; excavating and grading, $14,500; concrete, $40,800; reinforcing, $12,300; valve house, pipe and drain, $1,700; total, $70,-700; contingencies, enginering and inspecting, $3,535.

West Jefferson, O.—A bond issue for water works plant, to an amount of $20,-000 was approved by voters.

Billings, Okla.—Plans being prepared for water extensions; election will soon be held to issue bonds.

Checotah, Okla.—A $125,000 bond issue for water works was approved.

Kaw City, Okla.—Benham Engineering Co., consulting engineers, 13th floor, Colcord Building, Oklahoma City, Okla., prepared plans and specifications for the furnishing of all labor, tools and meterials necessary for construction of a water works and electric light system. Quantities of materials are as follows: 6-in. cast iron pipe, 6,250 ft.; 4-in. cast iron pipe, 4,450 ft.; 2-in. wrought iron pipe, 6,500 ft.; fire hydrants, 14; gate valves and boxes, 20; specials, 4,500 lbs.; No. 6 T. B. W. copper wire, 10,500 ft.; No. 8 T. B. W. P. copper wire, 25,000 ft.; No. 8 T. P. W. P. copper wire for street lights, 17,000 ft.; 1 7½ k.w. transformer; 1 5 k.w. transformer; 5 3 k.w. transformers; 2 2 k.w. transformers; street lights, 31; white cedar poles, 6-in. 30 ft., 110; 7-in. 40-ft., 2; cross-arms, break-arms, braces, insulators, pins, guys, lightning arresters, choke coils, 8 k.w. 6.6 ampere CC transformer; 2-panel switchboard; 37½ k.w. generator; 900 R. P. M. 50 h.-p. oil engine; power house building, open caisson well, reservoir 75,000 gallons; 250 G. P. M. centrifugal pump, 10,-000-gallon steel fuel oil tank.

Lindsay, Okla.—Ordinance passed authorizing $6,000 bonds to improve water works.

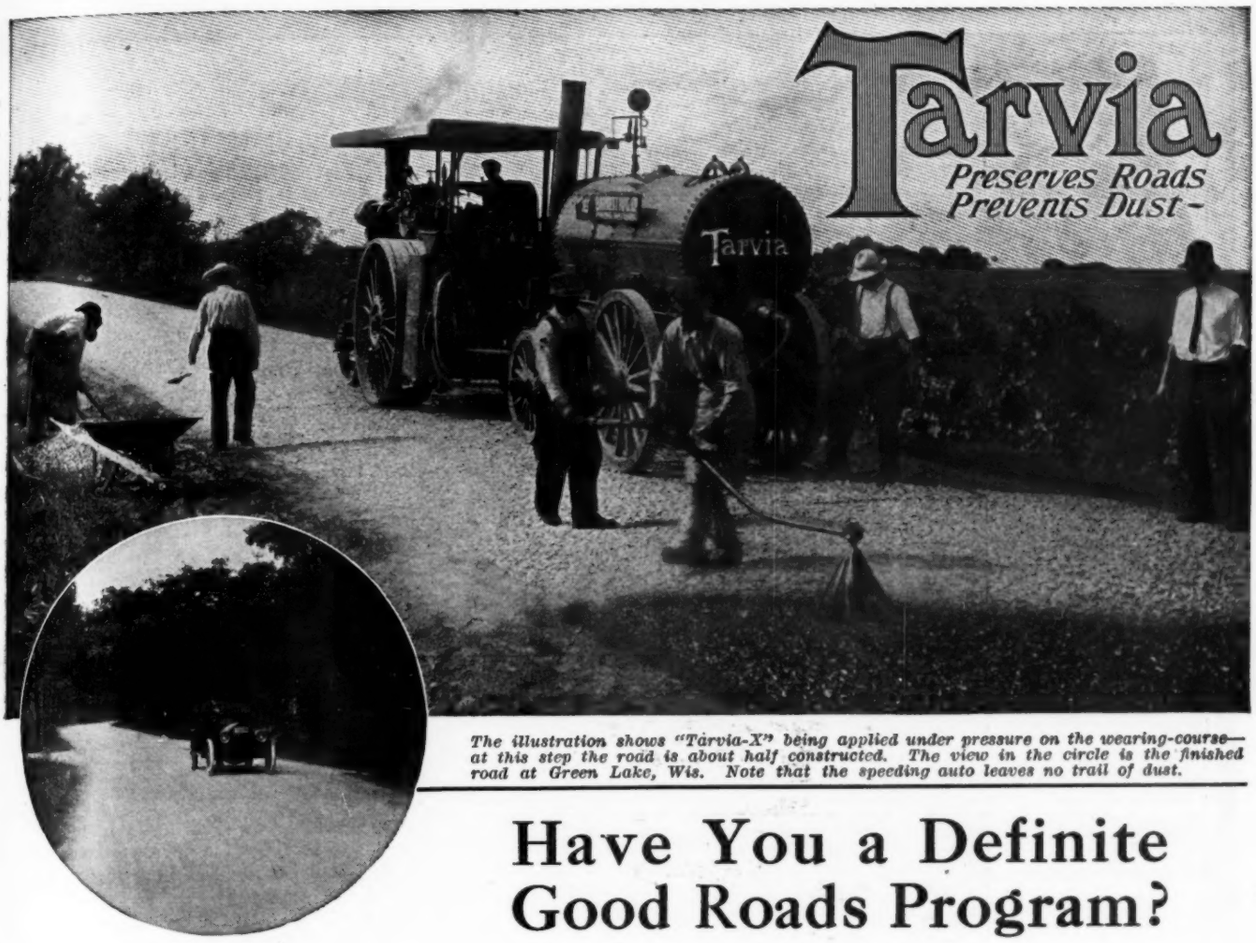
Sapulpa, Okla.—A 200,000-000 gallon dam on Euchee Creek will be constructed by city.

Harrisburg, Pa.—See "Streets and Roads."

Lebanon, Pa.—The first section of Lebanon's storm water sections of Lebanon's storm water proposition, for which $230,000 was authorized last fall, will be ready for letting by middle of April, to be shortly followed by the letting of contracts for the disposal plant and Third district of sanitary sewers. Application for blanks placed on file for reference when plans are finally completed. P. A. Volcker, City Engr.

Virden, Pa.—An election will be held in the future to decide on a new water system.

York Haven, Pa.—Borough council discussed fire protection. Constructing cisterns, a municipal water system or purchase a motor-driven fire apparatus are favored.



The illustration shows "Tarvia-X" being applied under pressure on the wearing-course—at this step the road is about half constructed. The view in the circle is the finished road at Green Lake, Wis. Note that the speeding auto leaves no trail of dust.

Have You a Definite Good Roads Program?

MOST municipal engineers in the large centers have what they call a "Road Program"; that is, the plan for all the streets and roadways within their jurisdiction covering from three to five years or more in the future.

In the smaller cities and towns such a paving program is occasionally prepared by outside consulting experts.

They come in and make scientific studies of the traffic on various streets—the grades, the kind of materials that are available, etc.

Then they lay out a complete scheme calculated to keep the road department working for many years ahead towards a well-defined objective of a perfectly paved town.

More frequently, however, no program is followed and roads are built and maintained by rather loose and costly methods. Every town, no matter how small, ought to have a definite road program.

Every county ought also to have one.

Roads should not be built in a patchwork, haphazard fashion, for the only result of such a policy is stretches of good roads interspersed with stretches of bad roads. As a chain is no stronger than its weakest link, so a road is only as passable as its poorest parts.

Therefore, alternating *good* and *bad* roads are a costly abomination to all who travel over them and all who pay taxes for their construction and maintenance.

Our Service Department has persuaded many towns to work out a systematic road policy; because we have been able to demonstrate that great sums of money can be saved by so doing.

A system of tarviated macadam—that is to say, macadam that has been bonded with Tarvia to preserve the surface and make it automobile-proof—is an almost indispensable part of every Good Roads Program to-day.

Tarvia roads are not only low in their first cost, but exceedingly low in maintenance cost.

Once a town or city adopts the policy of building Tarvia roads it rarely goes backward, but the mileage is increased from year to year.

The result of such a policy is a town where the roads are dustless and clean, the property values advancing, the road tax low and the taxpayers enthusiastic believers in and boosters of Tarvia.

There are several grades of Tarvia and a dozen methods of using the product.

We should be glad to mail you an illustrated booklet showing Tarvia roads all over the country that are giving the maximum of service and satisfaction at a minimum cost.

Special Service Department

This company has a corps of trained engineers and chemists who have given years of study to modern road problems.

The advice of these men may be had for the asking by anyone interested.

If you will write to the nearest office regarding road problems and conditions in your vicinity, the matter will have prompt attention.

The Barrett Company

New York Chicago Philadelphia Boston St. Louis Cleveland Cincinnati Pittsburgh Detroit
Birmingham Kansas City Minneapolis Nashville Salt Lake City Seattle Peoria
THE PATERSON MANUFACTURING COMPANY, Limited: Montreal Toronto Winnipeg Vancouver
St. John, N. B. Halifax, N. S. Sydney, N. S.

TRADE B MARK

STREETS AND ROADS.

Wayeross, Ga.—City council has passed an ordinance providing for the paving of Howe St. with gravel as material arrives. Paving will be carried east as far as the drainage canal, starting at Haines Ave.

Lafayette, Ind.—Bids received Mar. 9, 1917, at 2 p. m., by treasurer of Tippecanoe county, for sale, $10,000 highway improvement bonds, 4 per cent., ten years. Harry G. Leslie, Treasurer.

Mt. Vernon, Ind.—Bids received Mar. 6, 1917, at 2 p. m., by treasurer of Posey county, for sale $4,500 highway improvement bonds, 4½ per cent., ten years. Geo. J. Enrhardt, Treasurer.

Noblesville, Ind.—Bids received Mar. 10, 1917, at 11 a. m., by treasurer of Hamilton county, for sale, $880, $18,400, $2,280, $2,220, $5,860, $5 800, $7,000 ann $1,000 highway improvement bonds, 4½ per cent., ten years. L. G. Heiny, Treasurer.

Williamsport, Ind.—Bids received Mar. 5, 1917, at 1 p. m., by treasurer of Warren county, for sale $2,800, $5,800, $10,640 and $14,620 highway improvement bonds 4 per cent., ten years. Ernest Grey, Treasurer.

East Baton Rouge Parish, La.—Road District No. 2, $130,000 bonds purchased by the Louisiana National Bank of Baton Rouge.

Flint, Mich.—C. E. Denison & Co. and the Tillotson & Wolcott Co. successful bidders for $56,881 paving bonds, $278,-559 sewer bonds and $66,100 water works extension bonds bearing 4½ per cent. interest, at a premium of $1,240.53.

Mt. Clemens, Mich.—Terry, Briggs & Co., of Toledo, recently purchased highway improvement bonds for $300,000.

Great Falls, Mont.—Resolution calling for bids on half the road bond issue of $200,000, voted last fall, were adopted by the board county commissioners.

Gastonia, N. C.—Street improvement bonds for $150000 purchased by Messrs. Spitzer, Rorick & Co., of Toledo. T. A. Ratchford, City Clk.

Cambridge, O.—The New First National Bank of Columbus successful M. & S. St. improvement bonds, $19,310. J. J. Calvert, City Auditor.

Findlay, O.—Messrs. W. L. Slayton & Co., Toledo, purchased $36,304 street paving and sewer bonds.

York, Pa.—Council authorized paving of Belvidere Ave., from Market St. to Philadelphia, and West St. from Market to Philadelphia, this year's paving schedule, which is to include nine sections of city highway. Plans to pave about 1.2 miles of street at a cost of about $50,000.

BIDS RECEIVED AND CONTRACTS AWARDED.

(*Indicates Contracts Awarded.)

Lemoore, Cal.—For paving with 1½-in. Topeka on 2½-in. asphaltic concrete base, 640,000 sq. ft., including 9,000 cu. yds. excav., and 1,000 ft. guard fence on highway No. 1, Div. 4, between here and Browndale Road, by Bd. Supervs. Hanford to *Thompson Bros., Fresno, Cal., at $31,500.

Columbus, Ind.—Purchase of a Studebaker uniform pressure power street flusher, for use on the paved streets of this city, was made by city council. Flusher will have a capacity of 750 gallons, will be horse drawn, and will be equipped with a gasoline engine to provide the necessary pressure. The cost is $1,750 with 2 per cent. off for cash, which the city will pay.

Pittsfield, Mass.—Board of public works for road oil as follows: *Standard Oil Co.; road tar, *American Tar Co.; gate valves, *Chapman Valve Co., of Indian Orchard; brass goods, *United Brass Co., 3844 Hamilton Ave., Cleveland, O.; cast iron pipe, *Warren Foundry & Machine Co., 11 Broadway, New York; hydrants, *R. D. Wood & Co., 400 Chestnut St., Philadelphia, Pa.; vulcanite cement, *Falkner Lumber Co. of this city; tile, *Frank Howard of this city.

Rahway, N. J.—For bituminous material or asphalt binder for street purposes, amounting to 50,000 gallons, one bid was received from the Standard Oil Co., the price quoted being 11½ cts. per gallon, to be spread at such rate per yard as desired. The council was given two weeks to accept the bid.

Madison, S. D.—Bids opened Feb. 19, street pavement, bitulithic, 13,550 sq. yds.; natural lake sheet asphalt, 20,000 sq. yds., including 5-in. and 4-in. concrete foundation; excav. earth, 16,000 cu. yds.: *C. H. Atkinson Paving Co., Sioux Falls, S. D., bitulithic paving per sq. yd., $2.15; excav., 50 cts.; total, $33,-258.45. Sheet asphalt paving, per sq. yd., $1.85; excav., 50 cts.; total, $54,682.46. Chas. A. Trimmer, City Engr.

Dallas, Tex.—The city commisioners, for the paving of approximately 2½ miles of streets at a cost of about $200,-000. To *Vibrolithic Construction Co., Parry Ave., Stonewall to Henderson, $1.62 per sq. yd., $31,767.23; Parry Ave., Haskell to Peak, $1.75, $6,606.94; East Grand Ave., Fitzhugh to city limits, $1.75, $9,325.83; Ash Lane, Fitzhugh to Henderson, $1.62, $11,550.76; Stonewall, Peak to Forney, $1.75, $12,683.55; Hood St., Gillespie to Buckeye, $1.62, $6,127.38. Standard Engineering & Construction Co., Eighth St., Bishop to Willomet, $1.98, $29,785.11; Thomas Ave., Haskell to Hall, $1.98, $18,056.28; Peak, East Side to Forney, $1.98, $23,772.58. *Texas Bitulithic Co., Practorean Bldg., Colson St., Reiger to Columbia, $2.30, $3,575.86; Columbia Ave., Beacon to city limits, $2.30, $9,324.70; East Grand Ave., Forney to Fitzhugh, $2.30, $19,617.28; Leonard St., San Jacinto to McKinney, $2.30, $23,-424.16.

Charleston, W. Va.—Warranite, at a cost of $63,429, will be used in the construction of Loudon district permanent highway from the south end of the Kanawha City bridge to Malden, a distance of 3 miles, by the county court to *R. M. Hudson & Co., of Charleston. The Hudson Co. had bids on concrete, $58,-629; monolithic brick, $64,029; asphaltic concrete (Aztec), $55,029; asphaltic concrete (Texaco), $55,029, and Warranite. Other bids, those of Weaver & Glover, of Charleston, brick, with a 5-in. concrete base, $65,742, and Central Engineering Co., asphaltic concrete (Trinidad), $58,579.

Parkersburg, W. Va.—*Graham Bros., Washington Ave. from Oak to Plum Sts. to be paved with Athens Dunn wire-cut block, at $5,857.59; Depot St. from Harris St. to a point about 650 ft. east, with Athens Dunn wire-cut block, at $3,805.84; 12th St. from Ann St. to Murdoch Ave. with Athens Hillside block, at $1,712.66. C. Kennedy & Son's bids: Washington

Ave., $8,372.50; Depot St., $5,418.30. The appropriations for the same streets were:: Washington Ave., $6,232.90; Depot St., $4,244.50; 12th St., $1,976.50. C. Kennedy & Son submitted a bid of $22,553.60 for Athens brick and concrete curb, or $22,449.80 with the same brick and stone curb, for the paving of Juliana St. from Third to Eighth St. The contract was not let, as the appropriation for the street was only $18,586. City Engineer Higgs.

Bellingham, Wash.—For paving Dakin St. through Silver Beach, only bidder, K. Sanset, local, at $18,042 for concrete and $18,241 for asphalt. Board of Pub. Wks.

SEWERAGE.

Tolsom, Cal.—The Bank of Italy, of San Francisco, successful bidder for $20,000 sewer bonds. Oscar J. Miller, Secy. Sanitary Board.

Des Moines, Ia.—Highland Park practically assured of a new sewer.

Andover, Mass.—Will be acted on Mar. 5, to see if the town will vote to extend the sewer on Summer St. from Pine St. to a point 1,400 feet distant, and appropriate the sum of $3,000, the same to be expended under the direction of the board of public works and to assess btterments upon the estates benefitfied by said extension, on petition of the board of health.

Niagara Falls, N. Y.—Messrs. Hornblower & Weeks of New York were successful bidders for sewer system bonds to the amount of $192,000.

Findlay, O.—See "Streets and Roads."

Parkersburg, W. Va.—City engineer was authorized to use the sewer pipe which had been purchased for Market St. sewers in constructing a sewer in Charles St., between Swan and Lynn Sts., in preparation to paving Swan St. this summer.

BIDS RECEIVED AND CONTRACTS AWARDED.

(*Indicates Contracts Awarded.)

Los Angeles, Cal.—For constructing sewers: B. Z. Wucetich, 1134 E. 10th St., Long Beach, 588 10th St., $13,850; Edwards Ave. sewer, *Louis Volentario, 717 South Hartford Ave., Los Angeles, $42,500; Seward St. sewer, *John Balch, Los Angeles, $43,700; Mike Chutuk, 532 S. Matthew St., Los Angeles, $45,418; Sanborn Ave. and Sunset Blvd. sewers, Mike Chutuk, $23,818; next lowest, John Balch, Los Angeles, $25,548; Malagenovich & Gillespie, 3912 Wisconsin St., Los Angeles, $25,750. Lowest bids opened Feb. 13 by Board of Pub. Wks.

La Fayette, Ind.—For constructing pipe sewers, laterals of 6th Ward sewerage system, lowest bidders, bids opened Feb. 14: Foley Constr. Co., 127 N. Dearborn St., Chicago, Ill., $46,675; N. B. Moore & Son, W. Lafayette, Ind., $48,902; Moreno-Burkham Constr. Co., Syndcate Terminal Bldg., St. Louis, Mo., $51,383. H. B. Overesch, City Engr.

Dows, Ia.—*Arthur A. Dobson, Lincoln, Neb., for constructing sewers at $15,655. Disposal plant, *R. C. De La Hunt, Cedar Rapids, $3,980. M. Tschirgi & Sons, Engrs., Cedar Rapids.

Niagara Falls, N. Y.—City Manager Carr opened bids for $180,000 worth of new sewers. Nine bidders. The Read-Coddinton Co., only bidder on the Second St. tunnel trunk sewer, which will relieve the Falls St. main. Two bids for the Buffalo Ave. extension, and five for a sewer in 24th St. The money is now available from a bond issue of $192,000 recently authorized. Will be presented to the council.

Portland, Ore.—Council to *Jim Tekoff for the construction of a sewer in East Madison St. from a point near E. 11th St. to 136 ft. east of E. 10th St.

York, Pa.—*Paul R. Hostetter, this city, for sanitary sewer work and materials, at $3,276.75. Other bid: G. H. Heiges & Son, $3,390.

Dallas, Tex.—For a storm sewer on Peak St., Lafayette to Haskell Place, to *D. W. Summerfield at $1,834.05.

WATER SUPPLY.

Berkeley, Cal.—City council went on record in declaring its intention to submit to the voters a proposition for bonding the city for $2,500,000 with which to build a water distributing system. Steps will be taken to submit it at the first election following the one in April.

Coalinga, Cal.—Water works bonds of $100,000 purchased by Messrs. Carstens & Earles, Inc., of Seattle. F. A. Woods, Secy. Board of Supervisors.

Bancroft, Ia.—Messrs. Schanke & Co., Mason City, purchased $15,000 water bonds.

Duluth, Minn.—The extension of gas and water mains from West Duluth to Smithville, Morgan Park, Gary and New Duluth will be carried out this year, entailing an expense aproximately of $45,000. Will start from the present terminus at 84th Ave. west and Grand and extend about two miles. Among the large improvements planned for 1917, but which will be held over until prices are more favorable, are the following: Installation of a new pump at the Lakewood pumping station with a capacity of 20,000,000 gallons. Construction of a 20,000,000 gallon high pressure system as a fire protection in the downtown district. Only the mains deemed necessary will be laid in order to keep the expense down, as the price of cast iron pipe has risen considerably in the last year. It had been planned originally to lay about 20 miles of mains this year.

Duluth, Minn.—The proposed construction of a pumping station and building at Woodland will be carried out, as the total expense will not exceed $8,000.

Lake Crystal, Minn.—Funding water and sewer bonds, $30,000 authorized by City Comnrs.

Crystal Springs, Miss.—The election ordered here by the city authorities under a special act of the legislature, to determine on the question of giving the Board of Aldermen authority to lease or not to lease the municipal water and light plant, carried.

Scobey, Mont.—Water works, $19,000 bonds will be voted Mar. 2.

Havelock, Neb.—See "Sewerage."

North Tonawanda, N. Y.—Mar. 19 has been set to vote $80,000 water works system improvement bonds.

North Hempstead, N. Y.—Messrs. Hornblower & Weeks of New York successful bidders for Albertson Water Dist. bonds; $35,000.

Potsdam, N. Y.—The proposition to issue bonds for $190,000 for the purpose of bringing water from Barton Brook to Potsdam will be submitted at the coming village election in March. C. E. Haywood, of the Mun. Bd.

Asheville, N. C.—Comnr. of Pub. Wks. recommended that a 4-in. water main be built from the intersection of Church and First Sts. to the intersection of Buncombe and that a water hydrant be installed at that point.

Lumberton, N. C.—Messrs. Cummings, Prudden & Co. of Toledo, successful bidders for the water and light improvement bonds; $51,000. Ira B. Townsend, City Clk. and Treas.

Portland, Ore.—City Aud. A. L. Barbur will receive bids Mar. 22, semi-annual 25-yr. water bonds, $75,000.

Frederick, Okla.—An election will be held Mar. 20 to vote $95,000 water system extension.

Ramona, Okla.—The election resulted in favor of $4,000 water works bonds. W. W. Byess, Town Clk.

Springfield, Tenn.—Messrs. H. C. Speer & Sons Co., of Chicago, successful bidders water works improvement bonds; $36,000. Chas. E. Bell, Mayor.

Sistersville, W. Va.—Hanchett Bond Co. of Chicago successful bidder filtration plant bonds; $30,000.

West Allis, Wis.—Whether West Allis will install its own municipal water works or continue to get its supply of water from Milwaukee will be decided by the people at the April election as the result of an ordinance introduced by Ald. Rogers.

London, Ont.—For fire protection purposes City Council plans to lay 6-in. mains to Byron Sanatorium; work to start in the spring. E. V. Buchanan, City Hall, Supt. of Utilities Comn.

Niagara Falls, Ont.—Water mains on portion of Main St. is plan of City Council. City Engr. W. C. Jepson.

Strathroy, Ont.—For a $5,000 motor-driven turbine pump, the town council will call tenders shortly. Engr., A. R. Smithnim.

MISCELLANEOUS.

Jacksonville, Fla.—City improvement bonds amounting to $250,000 were sold for $258,799.99. The Atlantic Natl. Bank of this city was the purchaser, the premium being $8,799.99.

Andover, Mass.—To be acted on at its annual town meeting Mar. 5 to see if the town will authorize the Bd. of Pub. Wks. to establish a service for the removal of ashes and garbage from dwellings, stores, etc., in the central section of the town, partial payment for such services to be secured by a seasonable assessment, upon owners of property benefited, and the balance to be paid by the town, and to appropriate $1,500 therefore.

St. Paul, Minn.—Decision not to push the movement for an enabling act to permit an issue of $500,000 of bonds for harbor improvements has been made by the legislative committee of the St. Paul Assn. and the directors of that organization.

Austin, Tex.—The Attorney General's Dept. approved of a $32,000 issue of Dewitt County jail bonds, payable in 20 years, with ten-year option, and bearing 5 per cent. interest.

NOTICE TO CONTRACTORS, STATE OF NEW YORK, Office of the State Commission of Highways, Albany, N. Y.—Pursuant to the provisions of Chapter 30, Laws of 1909, as amended by Chapter 646, Laws of 1911, and Chapter 80, Laws of 1913, sealed proposals will be received by the undersigned for furnishing and delivering bituminous materials f.o.b. cars at destination, for use by the State Highway Department in the maintenance and repair of improved state and county highways in all of the counties of the State unless otherwise specified, at the office of the State Commission of Highways, 55 Lancaster Street, Albany, N. Y., at one o'clock p. m., Monday, the 19th day of March, 1917, for the following contracts:

B. M. Contract No. 1—Bituminous Material A—Binder.

B. M. Contract No. 2—Bituminous Material A—L. C. O.

B. M. Contract No. 3—Bituminous Material T—Binder and Hot Application.

B. M. Contract No. 4—Bituminous Material T—Cold Application in tank cars.

B. M. Contract No. 5—Bituminous Material Cold Patch Asphaltic Emulsion in Divisions Nos. 1, 2 and 4.

Sealed proposals will also be received by the undersigned at their office, 55 Lancaster Street, Albany, N. Y., on Tuesday, the 20th day of March, 1917, for the following contracts:

B. M. Contract No. 6—Bituminous Material A—L. H. O.

B. M. Contract No. 7—Bituminous Material T—Cold Application in barrels.

B. M. Contract No. 8—Bituminous Material Cold Patch Asphaltic Emulsion in Divisions Nos. 3, 5, 6, 7, 8 and 9.

All proposals, except contracts Nos. 5 and 8, will be for furnishing the specified material at any railroad delivery point within the State. Proposals for contracts Nos. 5 and 8 will be for furnishing the specified material at any railroad point within the counties comprising the Divisions named in the proposal.

Tables showing approximate quantities and railroad delivery point, specifications and proposals may be obtained at the office of the State Commission of Highways at Albany, N. Y.

Each proposal must be accompanied by cash or a certified check payable to the order of the State Commission of Highways for an amount equal to at least five per centum of the amount of the proposal which such cash or check accompanies. This cash or check will be held by the Commission until the contract is executed and the bond is filed.

The successful bidder on each proposal will be required to give a bond for 50 per centum of the amount of the contract, such bond to be executed by a Surety Company to be aproved by the Commission. The bond is for the purpose of insuring the delivering of the bituminous material as called for by the Commission.

The right is reserved to reject any or all bids.

EDWIN DUFFEY,
Commissioner.

I. J. MORRIS,
Secretary.

Proposals.

Sealed proposals will be received by the Board of Mayor and Aldermen of Johnson City, Tennessee, for:

100—¾ inch straight gallon water meters.
2—¾ inch straight gallon water meters.
2—1 inch straight gallon water meters.
2—2 inch straight gallon water meters.

Samples of meters bid upon must be submitted with each bid. Bids close 7 P. M., Tuesday, March 20th, 1917. The right is reserved to reject any or all bids.

P. F. McDONALD,
Commissioner and Engineer.

WM. R. PONDER,
Recorder.

OFFICIAL ADVERTISING

"Reaches Most Bidders at the Least Cost"

Rate $2 an inch. Copy reaching us by 10 a. m. Thursday will go in issue mailed that night.

Notice to Paving Contractors

Sealed Proposals for grading, curbing and paving the below-named streets will be received by the undersigned at his office in the City Hall until 11:00 o'clock a. m., March 15, 1917:

West Washington Avenue from west end of Bridge to east line of Walnut Street, 10,400 square yards.

South Walnut Street from south line of West Hudson Street to west line of Broadway, 6,800 square yards.

Erie Street from south line of East La France Street to north line of East Miller Street, 3,160 square yards.

West La France Street from east line of Pennsylvania Avenue to Pennsylvania R. R., 2,200 square yards.

Plans and specifications are on file in the City Engineer's office, City Hall, where also may be obtained the "proposal blanks," which must be used.

Separate certified checks are required as follows: West Washington Avenue, $2,500; South Walnut Street, $1,700; Erie Street, $700; West La France Street, $500—payable to the order of the Mayor of Elmira, N. Y., and must accompany the bids. They will be returned to the bidders upon execution of the contracts.

The Board of Public Works reserves the right to reject any or all bids.

LOUIS C. ANDREWS,
City Clerk.

City of Dowagiac, Mich. Board of Public Works

Sealed proposals will be received at the office of the undersigned up to 7 P. M., Friday, March 16th, 1917, for the installing of two (2) ten (10) inch wells of approximately 100 feet deep at the City Water Works at Dowagiac, Michigan.

Certified check for ten per cent. (10%) of amount of bid required. A bond for an amount equal to the amount of the contract required after notification of the award.

All bids must be enclosed in sealed envelopes and endorsed "Proposal for Wells."

The right is reserved to reject any or all bids.

Specifications and blank forms of proposals may be had on application to the City Engineer.

W. E. REYNOLDS,
City Engineer.

TRANSITS AND LEVELS
RENTED OR SOLD
EASY TERMS

THE ENGINEERING AGENCY, Inc.
13 West Jackson St. Chicago

TREASURY DEPARTMENT, Supervising Architect's Office, Washington, D. C., February 23, 1917.—Sealed proposals will be opened in this office at 3 p. m., April 4, 1917, for the construction of the United States post office at Charlton, Iowa. Drawings and specifications may be obtained from the custodian of the site at Charlton, Iowa or at this office, in the discretion of the Supervising Architect. JAS. A. WETMORE, Acting Supervising Architect.

FOR SALE
Portable Asphalt Plant

Used only 3 months. Great bargain for immediate sale; 1,800 sq. yds. a day. Double Shell Dryer, 3 Jet Oil Burner, 60 H. P. Boiler, all on wheels; 20 H. P. Engine, 3 Kettles, 1,000 gal. each; Westinghouse Air Compressor, Mixing Box, Elevators, Hoppers, Belts, etc. Write S. N. H., c/o Municipal Journal, 50 Union Sq., New York.

RAILS 50 MILES 60 LB.

A.C.E.E. Section with continuous bars.
Almost New Western Delivery
CARS, EQUIPMENT, PILING
ZELNICKER IN ST. LOUIS

WANTED—Plant foreman to have charge of and operate asphalt plant for sheet asphalt pavements. Also a **street foreman.** State experience, references and salary wanted. Steady position to right party. Address J. Rasmussen & Sons Co., Oshkosh, Wis.

Macadam Roller

For Sale at a sacrifice price if purchased at once. Address "X Y Z," care Municipal Journal.

Sealed bids will be received by the Monroe County Road Commissioners at Monroe, Michigan, until 10 A. M. Standard time, March 6, 1917, on the Dixie Road, 13.57 miles, Monroe to Rockwood, 7-inch Cement-Concrete construction. Plans and specifications on file County Road Commissioners' Office, Monroe, Mich. Separate bids will also be received for constructing said road in three sections, viz., for constructing the south four miles in length, for constructing the central four miles in length, and for constructing the north 5.7 miles in length. The separate bids will be preferred if their aggregate sum should be less than the bid for the whole road, as one job. Each bidder will be required to put up a cash deposit of $1,000 on his bid on the proposed improvement as an evidence of good faith on his part.

WANTED

10 ton Macadam Roller for immediate delivery. Must be in good shape. Will pay cash if price is right.

Municipal Journal, Box 990.
50 Union Square, N. Y. City

BUYERS' CLASSIFIED DIRECTORY

of Names and Addresses of the Most Reliable Firms from Whom to Buy Materials Appliances and Machinery Needed by Municipal Departments and Contractors

Cement

Allentown Portland Cement Co., Allentown, Pa.
Atlas Portland Cement Co., 30 Broad St., N. Y.
*Lehigh Portland Cement Co., Allentown, Pa.

Contractors' Equipment

(See Paving Machinery also.)

AIR COMPRESSING PLANTS (Portable).
*Gardner Governor Co., Quincy, Ill.

AIR DIFFUSING FILTROS PLATES.
*General Filtration Co., Cutler Bldg., Rochester, N. Y.

DUMPING BUCKETS.
Stuebner, G. L., Iron Works, Hancock St., Long Island City.

LOCOMOTIVE CRANES.
*Brown Hoisting Machinery Co., Cleveland, O.

MOTOR TRUCKS, DUMPING.
*General Motor Truck Co., Pontiac, Mich.
*General Vehicle Co., Long Island City, N. Y.
*Kissel Motor Car Co., 570 Kissel Ave., Hartford, Wis.
*White Co., Cleveland, Ohio.

PUMPS, DIAPHRAGM.
*Parker, A. A., Waterford, N. Y.

Drawing Materials

BLUE PRINTS AND PAPER.
New York Blue Print Paper Co., 58 Reade St., New York.

Fire Dept. Equipment

AERIAL TRUCKS.
*Boyd, James, & Bro., 25th and Wharton Sts., Philadelphia, Pa.

COMBINATION CHEMICAL AND HOSE WAGONS.
*American-La France F. E. Co., Elmira, N. Y.
*Boyd, James & Bro., 25th & Wharton Sts., Philadelphia, Pa.
*Kissel Motor Car Co., 570 Kissel Ave., Hartford, Wis.

FIRE ALARM SYSTEMS.
*Loper Fire Alarm Co., Stonington, Conn.

FIRE ALARM TELEGRAPH.
*Gamewell Fire Alarm Telegraph Co., Grand Central Terminal, N. Y.

FIRE HOSE.
*Eureka Fire Hose Co., 27 Barclay St., N. Y.
*Fabric Fire Hose Co., Duane & Church Sts., New York.

FIRE PROTECTORS.
*Kessler Safety Device Co., 6305 South Peoria St., Chicago, Ill.

GASOLENE STORAGE SYSTEMS.
*Bowser, S. F. & Co., Inc., Fort Wayne, Ind.

PUMPING ENGINES, GASOLENE.
*American-La France F. E. Co., Elmira, N. Y.

RUBBER TIRES.
*Goodyear Tire & Rubber Co., Akron, O.
*U. S. Tire Co., Broadway & 58th St., New York.

TRACTORS.
*Couple Gear Freight Wheel Co., Grand Rapids, Mich.

TRIPLE COMBINATION MOTOR.
*American-La France F. E. Co., Elmira, N. Y.

Paving Machinery

ASPHALT PLANTS.
*Cummer & Son Co., F. D., Cleveland, O.
*East Iron & Machine Co., Lima, O.
*Hetherington & Berner, Indianapolis, Ind.
*Warren Bros. Co., Boston, Mass.

BRICK CONVEYERS.
*Mathews Gravity Carrier Co., Elwood City, Pa.

BRICK TESTING MACHINES.
*Hetherington & Berner, Indianapolis, Ind.

CONCRETE MIXERS.
*Ransome Concrete Machinery Co., 115 Broadway, New York.

OIL DISTRIBUTORS.
*Austin Western Road Mach. Co., Chicago, Ill.
*Kinney Mfg. Co., 3535 Washington St., Boston, Mass.

ROAD GRADERS.
*Austin-Western Road Mach. Co., Chicago, Ill.

ROAD ROLLERS.
*Austin-Western Road Mach. Co., Chicago, Ill.
*Buffalo Springfield Roller Co., Springfield, O.

SAND SPREADERS.
*Kindling Machinery Co., Milwaukee, Wis.

SCRAPERS.
*Austin-Western Road Mach. Co., Chicago, Ill.

TAR KETTLES, ASPHALT HEATERS, ETC.
*Littleford Bros., Cincinnati, O.
*Warren Bros. Co., 142 Berkeley St., Boston.

Paving Materials

ASPHALT.
*Bitoslag Paving Co., 90 West St., New York.
*Pioneer Asphalt Co., Lawrenceville, Ill.
*Standard Oil Co., 26 Bway, New York, N. Y.
*Standard Oil Co., 72 W. Adams St., Chicago.
*U. S. Asphalt Refining Co., 90 West St., N. Y.

BINDERS.
*Baker, John, Jr., 17 Battery Pl., New York.
*Barrett Co., The., 17 Battery Pl., N. Y.
*Headley Good Roads Co., Thirtieth & Spruce Sts., Philadelphia, Pa.
*Pioneer Asphalt Co., Lawrenceville, Ill.
*Robeson Process Co., 18 E. 41st St., N. Y.
*Standard Oil Co., 26 Broadway, N. Y.
*U. S. Asphalt Refining Co., 90 West St., N. Y.

BITUMINOUS PAVEMENTS.
*Amies Road Co., Easton, Pa.
*Bituminized Road Co., Kansas City, Mo.
*Barrett Co., The, 17 Battery Pl., N. Y.
*Warren Bros. Co., 142 Berkeley St., Boston.

BRICK.
*The Barr Clay Co., Streator, Ill.
*Clydesdale Brick & Stone Co., Oliver Bldg., Pittsburgh, Pa.
*Metropolitan Paving Brick Co., Canton, O.
*Schuylkill Valley Vitrified Products Co., Oaks, Montgomery County, Pa.
*Terre Haute Vitrified Brick Co., Terre Haute, Ind.
*Thornton Fire Brick Co., 909 Goff Bldg., Clarksburg, W. Va.

EXPANSION JOINTS.
*Barrett Co., The., 17 Battery Pl., N. Y.
*Carey Mfg. Co., Philip, Lockland, Cinn., O.
*Pioneer Asphalt Co., Lawrenceville, Ill.
*Asbestos Protected Metal Co., Pittsburgh, Pa.
*Trussed Concrete Steel Co., Youngstown, O.

JOINT PROTECTION (CONCRETE).
*Trussed Concrete Steel Co., Youngstown, O.

OIL.
*Baker, John, Jr., 17 Battery Pl., N. Y.
*Barrett Co., The, 17 Battery Pl., N. Y.
*Pioneer Asphalt Co., Lawrenceville, Ill.
*Standard Oil Co., 26 Broadway, N. Y.
*U. S. Asphalt Refining Co., 90 West St., N. Y.

ROCK ASPHALT.
*Republic Creosoting Co., Indianapolis, Ind.
*Wyckoff Pipe & Creosoting Co., 30 E. 42d St., New York.

Public Lighting

INSULATED WIRES AND CABLES.
*Okonite Co., 253 Broadway, N. Y.

Scientific Instruments

ENGINEERS' TRANSITS AND LEVELS.
*Buff & Buff, Jamaica Pl. Sta., Boston, Mass.
Heller & Brightly, 1124 Spring Garden, Philadelphia, Pa.

Sewerage

ACTIVATED SLUDGE AIR DIFFUSING PLATES.
*General Filtration Co., Cutler Bldg., Rochester, N. Y.

PIPE (CAST IRON).
*Central Foundry Co., 90 West St., N. Y City.
*Warren Foundry & Machine Co., 11 Broadway, N. Y.

PIPE CLEANING MACHINES.
*Champion Potato Machinery Co., 332 Sheffield Ave., Hammond, Ind.
*Stewart, W. H., 1614 Locust St., St. Louis.

PIPE JOINT COMPOUND.
*Superior Chemical Co., St. Louis, Mo.
*Pacific Flush Tank Co., 149 Broadway, N. Y.

SEWAGE DISPOSAL.

EJECTORS.
*Pacific Flush Tank Co., 149 Broadway, N. Y.

FORMS.
*Northwestern Steel & Iron Wks., Eau Claire, Wis.

NOZZELS.
*Pacific Flush Tank Co., 149 Broadway, N. Y.

SIPHONS AND FLUSH TANKS.
*Pacific Flush Tank Co., 149 Broadway, N. Y.

VITRIFIED FIRE CLAY SEWER TILE.
East Ohio Sewer Pipe Co., Irondale, O.
*National Fire Proofing Co., Pittsburgh, Pa.

Street Cleaning AND REFUSE DISPOSAL

FLUSHERS.
*American Car Sprinkler Co., Worcester, Mass.
*General Motors Truck Co., Pontiac, Mich.
*General Vehicle Co., Long Island City, N. Y.

*Advertisers—See Alphabetical Index on last white page.